R. R. KELLY, 20 FEB 77

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIX. No. 718.] LONDON, FEBRUARY 13, 1877. [29TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke, 66·70 per cent.; volatile matters, 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

RAMSAY'S ORDINARY GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1823. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwentaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT.

FOUR PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.

These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

STEVENS & CO.,
(SUCCESSORS TO SAMUEL CALLEY.)
21, GT. WINCHESTER ST., LONDON.
WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM,
MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS & PURIFIERS.
CONTRACTOR FOR
LAYING MAINS & ERECTING APPARATUS.
Light Steel Charging Coal and Coke Shovels, Charging Scoops, &c., &c., supplied promptly.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
LIMITED,
Established at the commencement of Gas Lighting.
BRANCH ESTABLISHMENTS:
69, UPPER THAMES STREET, E.C.;
4 & 5, CHARLES STREET, SOHO;
16, SOHO SQUARE, W.;
48, GREEK STREET, SOHO SQUARE;
83, COMMERCIAL ST., SPITALFIELDS; } LONDON.
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
16, ELLIS COURT, AIRE STREET, LEEDS.
MANUFACTORIES:
ALMA TUBE WORKS, WALSALL, AND
THE OLD PATENT TUBE WORKS, WEDNESBURY.

J. R. & Co., Ld., are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

Lists may be obtained on application to
HEAD LONDON OFFICE:
145, QUEEN VICTORIA STREET.
HEAD LONDON WAREHOUSE:
234, UPPER THAMES STREET, LONDON, E.C.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
ALSO, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
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MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

J. & H. ROBUS,
BUILDERS AND CONTRACTORS
FOR THE
ERECTION AND REBUILDING OF GAS AND WATER WORKS.
ESTIMATES FREE
FOR MAIN-LAYING AND GENERAL REPAIRS.
RETORT-SETTING A SPÉCIALITÉ.
ROBUS'S IMPROVED RETORT-SETTINGS guaranteed to carbonize a large amount of coal with a small per cent. of fuel.
N.B.—All kinds of Fire Goods, &c., kept in stock for immediate delivery. Orders promptly attended to.
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NITSHILL COMPANY'S
DUKE OF HAMILTON'S
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GEORGE GLOVER & CO.
PATENTEES OF THE
2. N[illegible]
3. No scurfing is re[illegible] GASOMETERS
4. Never a choked Pipe.
AND FOR [illegible] OVERNMENT
OF THE NETHERLANDS,
PLICATE COPY
Presented by Her M[illegible] to the French Government,
AND [illegible]RERS OF
IMPROVED DRY GAS-METERS
Warranted to Measure correctly & not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.
236, GEORGE STREET, GLASGOW, & 30, LANCASTER AVENUE, MANCHESTER.

FOREIGN AGENTS.
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JOSEPH AIRD,

WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

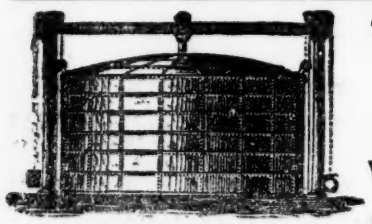
EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

Manufacturers of **W. J. WARNER'S PATENT MARKET GAS STAND-PIPE.**

Now ready, GAS CHANDELIER BOOK (Reduced Prices), 7s. 6d.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,
WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS,
GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

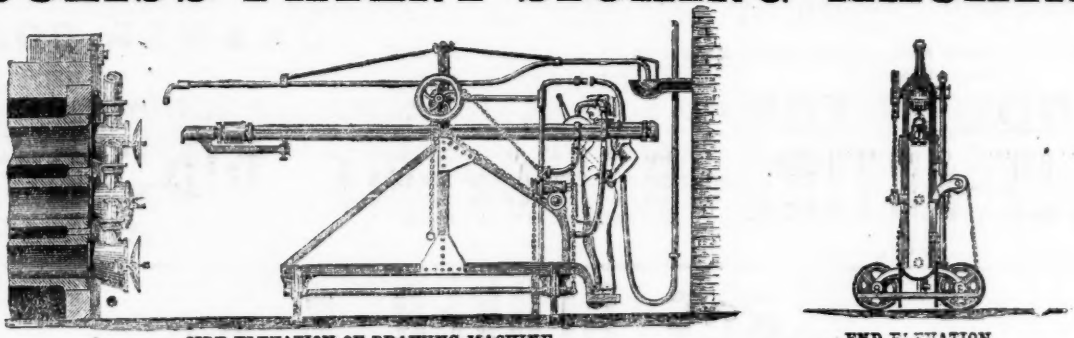
STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,
AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

LONDON OFFICES: 92, CANNON STREET.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: **TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GE... BOLDT, Kalk bei Deutz:**
Or all particulars may be had from JAMES WOTHERSPO... cent Place, Glasgow.

... FEARS...

Establishe... WORKS... 1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 800 days, and are yet in good order. References on application.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

GAS PURIFICATION & CHEMICAL Co., LIMITED.

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

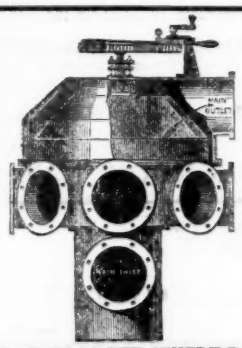
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

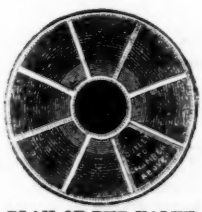
JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKERS'

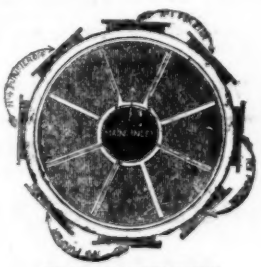
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

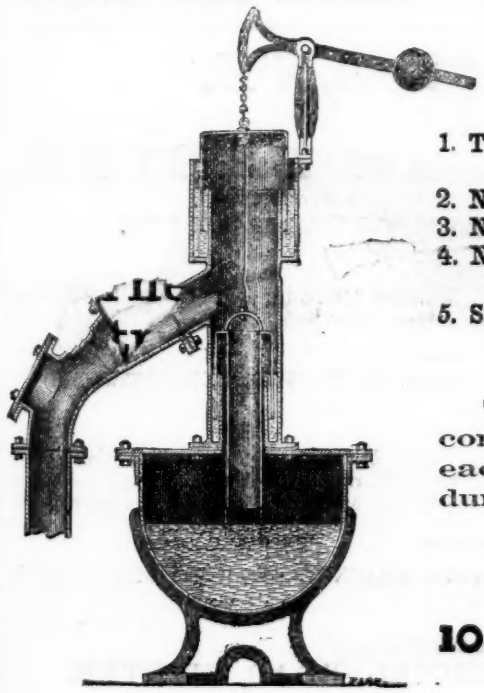
These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

Applications to be made to

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.,

Who fix the Dip-Pipes, at a small Charge, when required.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICE LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

Notice to Gas Companies

UNDER THE GAS-WORKS CLAUSES ACT, 1871, &c.

THE "LONDON" STANDARD BURNER,

"GAS REFEREES MODEL,"

For 14-candle and 16-candle Gas, as certified by the Board of Trade.

This Standard Burner, for verifying the illuminating power of 14 and 16-candle gases, has been re-adopted by the Corporation of the City of London and the Metropolitan Board of Works.

Vide **"The Gaslight and Coke Company's Act, 1876";**
"South Metropolitan Gas Company's Act, 1876"; and
"Commercial Gas Act, 1875".

The Metropolitan Gas Referees have re-verified and deposited Models of the Burner with the Board of Trade, which have been duly certified. One of them has now to be deposited with the Warden of the Standards.

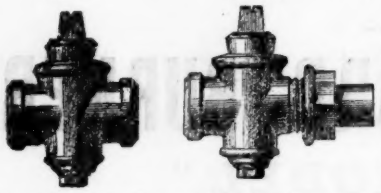
As soon as this is done, I shall be in a position to supply Copies of the Standard Burner, engraved in accordance with the instructions of the Board of Trade, enclosed in Mahogany Box with Glasses complete.

WILLIAM SUGG,
GAS ENGINEER,
VINCENT WORKS, VINCENT STREET,
WESTMINSTER, S.W.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

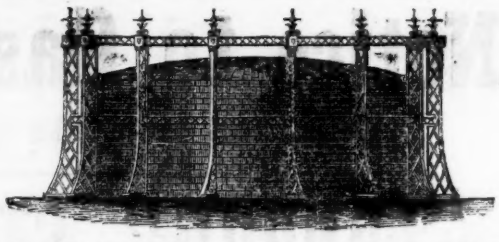
No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:
SHORT STREET, LAMBETH, LONDON.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

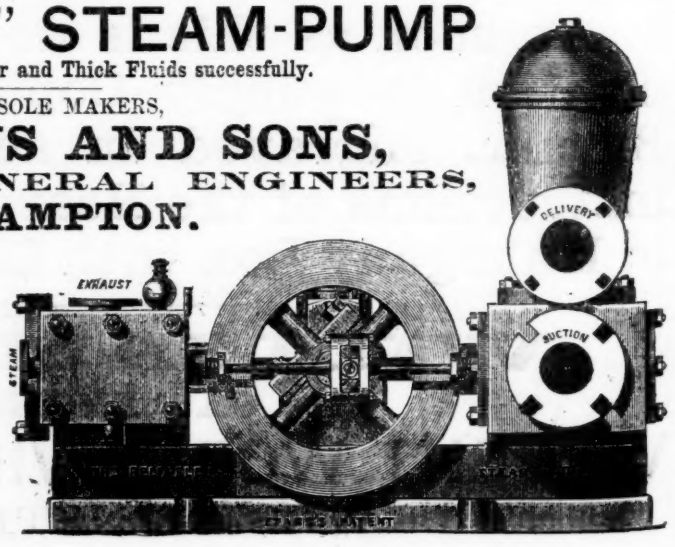
THE WIGAN COAL & IRON COMPANY,
LIMITED.
DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;
Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.
N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

WEST'S GAS IMPROVEMENT COMPANY,
LIMITED,
ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR
CHARGING AND DRAWING GAS-RETORTS,
And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*
The advantages attending its use are—
INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

THE "RELIABLE" STEAM-PUMP
Is the only Pump that will Pump Tar and Thick Fluids successfully.



PATENTEES AND SOLE MAKERS,
JOSEPH EVANS AND SONS,
HYDRAULIC AND GENERAL ENGINEERS,
WOLVERHAMPTON.

THE "RELIABLE" PUMP
Has been adopted by the
BIRMINGHAM CORPORATION GAS-WORKS,
THE GAS-WORKS AT BLACKBURN,
LEEDS, CARLISLE, DUDLEY, WOLVERHAMPTON,
ETC., ETC.,
And also by the Principal
TAR DISTILLERS IN THE KINGDOM.
MAKERS AND PATENTEES OF PUMPS OF ALL KINDS.
CATALOGUES ON APPLICATION.

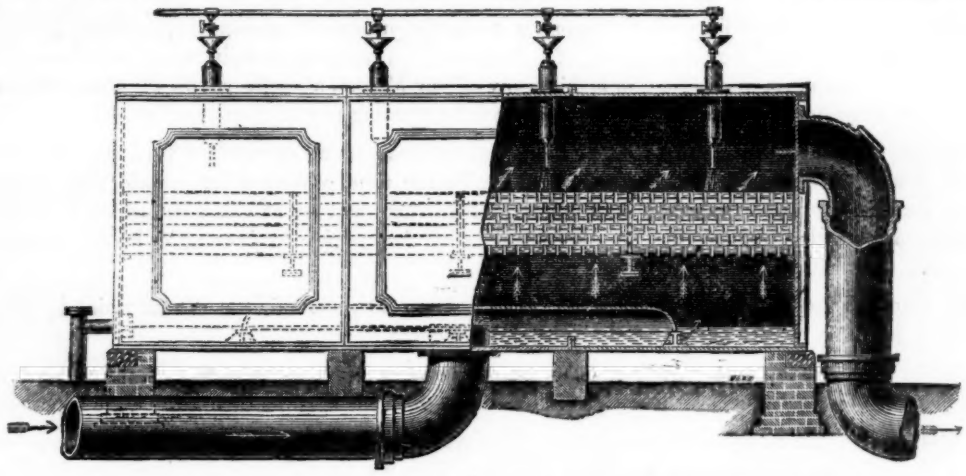
GAS PURIFICATION.

SAVILLE'S

SELF-DISTRIBUTING GAS SCRUBBER-WASHER.

PATENTED IN

GREAT BRITAIN, FRANCE, BELGIUM, PRUSSIA, AUSTRIA, & UNITED STATES.



MECHANICAL ARRANGEMENT.

The Washer Tank contains a large bottom chamber, into which the Gas is freely admitted through an ordinary full-way inlet-pipe, passing first under an inverted vessel which removes any Tar remaining in the Gas after leaving the Condenser; it then rises slowly over the whole surface, CONTAINING AN AREA OF ABOUT EIGHT TIMES THAT OF THE INLET-PIPE, through equidistant spaces in a series of Self-Sealing Water Troughs, arranged in tiers, dividing itself and passing through the various dips until it reaches the upper chamber, and from thence through the outlet-main.

The washing liquid being CLEAN WATER is admitted by the Syphon inlets on top of Tank to the upper row of troughs, running through each successive tier, and becoming impregnated with the impurities extracted from the Gas, gaining strength at each dip on its descent, and finally passing off by the outlet syphon at the bottom.

It will be observed that in this Scrubber-Washer the Gas comes first in contact with THE STRONGEST LIQUOR at the bottom, and passes through WEAKER LIQUOR at each successive tier, until it issues through CLEAN WATER into the upper chamber; hence the true principle of Gas Purification by Washing is simply and automatically effected.

ADVANTAGES.

Great economy in first cost and foundations.
Great saving of other purifying apparatus and material.
Occupies little space, and stands only a few feet in height.
Being entirely self-acting, requires no motive power either for purifying or distributing.
The Gas is washed several times in ONE vessel, each time in liquor of a different strength, ultimately passing through CLEAN WATER.
Produces liquor of any required strength by once passing through.
Can be fixed (if desired) at any elevation to permit Contractors' tanks being filled without the expense of pumping.

One of these Scrubber-Washers has been in successful operation for the past twelve months at the Sowerby Bridge Gas-Works, and they are now being erected at the Corporation Gas-Works, Adderley Street, Birmingham, and at the Phœnix Gas-Works, Vauxhall, London.

Prices and full Particulars on application to

TANGYE BROTHERS AND HOLMAN,

Sole Manufacturers,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

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WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

Several items of intelligence are unavoidably postponed, having arrived too late for insertion in this number. We shall be glad if correspondents will bear in mind that we cannot ensure space for communications which reach us on Monday morning.

W. P.—*Gas, or a mixture of gas and air, cannot be ignited without the application of flame. Sometimes the gas, or a mixture of gas and air, comes in contact with a flame, and the flame "backs;" hence explosions, which are regarded as mysterious, but which have a simple origin, and are seldom dangerous.*

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—*We hope to find room in our next for the excellent address of Mr. Wood, the president, at the meeting of the Association on the 9th inst.*

RECEIVED:—*Bodmin, Congleton, Eastbourne, Halifax, Kidderminster, Leicester, Macclesfield, Pontefract, Sutton-in-Ashfield.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 13, 1877.

Circular to Gas Companies.

WHILE all sections of politicians are congratulating one Earl on his accession to the House of Peers, we may be excused for, without any reference to general politics, congratulating another Earl on having obtained a step in the Peerage. Baron, now Earl, Redesdale can hardly be said to be a friend to Gas Companies; but the fact that he, more than any other man living, has assisted in moulding general gas legislation into the shape it has now assumed, seems to us to require some words in recognition of his services, the more so as we are glad to see that he will continue to occupy the post of Chairman of Committees in the House of Lords. We hope that he may long be spared to retain the office. We have said that Lord Redesdale is not to be regarded as the friend of Gas Companies. It is to him we owe the limitation of dividends on "additional" capital, and some other restrictions. We shall not, however, quarrel with his Lordship on this score. His great merits are the perfect consistency with which he maintains the principles he has laid down, and the even balance he holds between contending parties. Six and seven per cent. dividends are, after all, no great grievances, when it is known that they can be guaranteed. In the revolutionary part of recent Metropolitan Gas Legislation, we do not know that Earl Redesdale has given any active assistance. He has never insisted on auction clauses, though he has accepted them when brought before him. He has always allowed Gas Companies to borrow to the extent of one-fourth of the capital raised, while he has given to railway companies the power to borrow to the amount of one-third of the share capital. Perhaps, then, for these and other reasons, we should more properly characterize Lord Redesdale as the friend of gas proprietors. At all events, we can now only congratulate his Lordship on arriving at a higher dignity, and wish him long life to enjoy his elevated position.

Our readers, when perusing the abstract of Gas Bills, printed in another column, will, perhaps, with ourselves, be struck with the fact that recent Metropolitan Gas Legislation seems to have had but little influence over the measures proposed. It must be remembered that these are only *Bills*, and that we shall have to wait to know what the *Acts* passed will be. To a great extent, however, the Acts must be what the Bills are, for comparatively few of the measures presented this year will have to encounter powerful opposition. Turning to the Bills themselves, we do not find a single instance in which auction clauses are proposed. There is one which will specifically enact that new shares shall first be offered to existing proprietors, and, if not taken up, shall be disposed of in any way the directors think fit; but, supposing these to be sold by auction, the premiums might be regarded as profits, and applied accordingly. Again, we find the same proportion observed between the share and loan capital proposed, and that in no case is it intended to make the issue of share and loan capital in equal proportions compulsory. Then, as to the sliding scale, we observe but one instance in which it is proposed to introduce this into Provincial Gas Legislation. The circumstances of the United General Company, in Limerick, are, however, very peculiar, and we may felicitate the Directors on the happy thought which induced them to make the proposal. It may, perhaps, go a long way in disarming opposition. Not that we consider the position of the Company in Limerick at all critical. On the contrary, we believe that the Company will maintain their standing, and before long succeed in acquiring the undertaking of the Corporation. From the opposition of the newly-projected Company, we feel satisfied that the United General have nothing to fear.

It has been recommended by a distinguished humorist, that no one should prophesy until after the event had happened. We do not prophesy; but as "coming events cast their "shadows before them," we venture to say that the gas legislation of the present session will bear but a slight trace of the influence of recent Metropolitan Legislation. Candidly speaking, we expected otherwise, but are greatly pleased to see our anticipations unrealized.

Our readers will peruse with pleasure the cheerful speech of the Governor of The Gaslight and Coke Company. That great corporation, now representing the largest gas undertaking in the world, must necessarily be looked up to as a guide to smaller concerns—that is, so far as fair comparisons can be established. The Governor, it will be seen, traversed much the same ground we did in our "Circular" last week, but gave more precise calculations than we had time to make. That the present management of the vast undertaking is an enormous success, must be patent to all, from whatever point of view it is regarded. Wherever there is a failure, it proceeds from causes which no management can control. That is the case with the price of coke, from the depreciation of which the Company now suffer, and are likely to suffer for some time to come. A revival of industry will, we trust, soon take place, but nothing besides cold weather can bring coke up to what has been considerd its legitimate value. There exists, unhappily, a popular prejudice against the use of coke for domestic purposes, and hence its employment is confined to the poorer classes, and for manufacturing purposes. While coal remains comparatively cheap, coke can only command a sale at a relatively low price. We have often said that something might be done in London, as it

is done by the Paris Gas Company, to promote a more general use of coke for domestic purposes. The Chartered Company are now in a position to do all that is done by the Paris Gas Company. They have power to use patent inventions if they can find any good for anything; they can work up residuals; in fact, they can do anything dealing with gas and its products. Now we cannot help thinking that there is a good opening for the manufacture of artificial fuel at Beckton. There is not a spot in the world where it would sell as it might at Beckton, supposing a fuel made, adapted for consumption in steam vessels. It is in this direction, we rather think, that the Company must look for a profitable outlet for their coke and breeze. They have all the materials at hand. Only machinery is wanted, and we cannot help thinking that at Beckton there exists an exceptionally good opportunity for doing a profitable business in artificial fuel.

The explanation of the Governor respecting the commutation of annuities is very satisfactory, for the matter has been misunderstood. It is clear that the item of "Superannuation allowances, &c.," has nearly disappeared from the revenue account, and that the commutation has been effected in the most economical way possible. Something will, of course, remain to be paid annually for some years to come, inasmuch as there are, as is always the case, officers, mostly advanced in years, who prefer a pension, because they do not see their way to make a profitable investment of a commutation allowance. But we think we may take it as a fact that the pensions due from the Chartered Company are now nearly wiped out, and we believe that the unappropriated balance of the profits in the hands of the Directors could not, in the interests of the consumers, have been better employed than in effecting this desirable operation.

The scheme for making a complete anastomosis of the mains from the several manufacturing stations of the Company, recalls to us some remarks we made a fortnight ago as to the future of the testing-stations. When the combination projected is completed, which, we hope, will be done with the least delay possible, it is clear that the gas must be tested at the station where it is made. Objections will, of course, be urged against this by the local authorities on several grounds; but, if the Company are to remain liable to a penalty for any defect in gas made at a particular station, it is clear that the gas from that station must be examined before it can possibly become mixed with gas from other works.

We have before alluded to the Bill promoted by the Company to remove the sulphur difficulty, which was sanctioned by the proprietors at the meeting made special for the purpose. The measure will be opposed, and should the question be fully entered upon, we must suppose that the sulphur business will be settled, one way or the other, for all time—"a consummation devoutly "to be wished."

We are glad to see that our repeated advice has been, so far, taken, that a large number of unincorporated Gas Companies are this year applying either for Acts of Incorporation or for Provisional Orders which, when confirmed, will come to about the same things. How advisable it is that a Gas Company should be provided with statutory authority, in some shape or another, is shown in the case of the Bishop Auckland Company, who are, as our readers will see, promoting a Bill. They will see also, by a report in another column, that the Local Board of Bishop Auckland, taking advantage of the fact that the Company have no statutory powers, are applying to the Local Government Board, under the Public Health Act, for a Provisional Order, which, if granted, will enable them to set up competing gas-works. There are allegations of *mala fides* made against the Company, of which we know nothing. They may be true or not. All we wish to point out here is the relative advantages to the gas consumers offered by the Gas Company and the Local Board. The former propose to supply fourteen-candle gas, at the maximum price of 5s. per 1000 feet; the latter offer twelve-candle gas for 6s. per 1000. Need anything more be said? Except this, by way of general remark. Is it not extraordinary that in Durham, and our readers will see other towns, actually in, or close by coal-fields, gas should be dearer than in small towns in Surrey and Sussex? There are, we know, in some mining districts, particular reasons for a high price of gas. In others, like Bishop Auckland, there is, so far as we know, no reason why gas should be dear, except that coke will be nearly valueless.

We have received the annual report of the West of Scotland Association of Gas Managers for 1876-77. It is a compilation which reflects the highest credit on the Committee of the Association. We have, more than once, described the scope of the work, which aims at giving precise information relative to the gas supply of Scotland. We are sorry to see that the columns showing the details are not filled up to the extent we could wish; but, as it is, the report is of great value, seeing that it contains returns, more or less complete, from 259 Scottish gas undertakings. We shall return to it, after giving an attentive study to the contents.

The gas accounts of the Corporation of Leeds for the past year have been issued, and those of the Corporation of Birmingham will, we expect, be published this week. There are some interesting points in connexion with these latter, to which we shall refer when we have them before us. To-day we need only say that the undertaking has been worked to great advantage.

The dispute between the gas consumers and the Corporation of Wigan has waxed very fierce; but we are glad to see that there is a chance of its soon being settled. The Town Council, in accordance with the wishes of the consumers, have decided to call in an independent engineer to give his advice and opinion on the irritating question of increased bills for gas. The names of Mr. King (Liverpool), Mr. Paterson (Warrington), and Mr. George Livesey were mentioned to the Council, and we need only say, that the opinion of either one of these gentlemen should command the respect of the Wigan community. In the meantime, an able report by Mr. Hawkins, the Manager of the Corporation Works, seems to indicate clearly the origin, or rather cause, of the complaints. It appears that, in past times, no proper periodical inspection of meters was made in Wigan. A meter was fixed, and then expected, like Tennyson's brook, to "go on for ever." But it did not, and, as a matter of fact, one was discovered which had not registered a foot of the gas passed through it during six years. In such a case, the inspector would, of course, have to exercise more or less imagination when making out the gas bill. That the registration of the meters against the Corporation must have been enormous, may be inferred from the fact that, the loss by what, by a figure of speech, is called "leakage," amounted, in 1875, to 32 per cent. of the gas made. Under present management, however, a more complete system of meter inspection has been inaugurated, and this would seem to have had something to do with the increased bills. At all events, loss by leakage appears to have been considerably diminished during the past six months, in part, no doubt, owing to a very proper enlargement of the mains. In our experience, we have found very few of the exaggerated registrations of meters to be sustained by inquiry and examination. In a majority of instances, meters register against the gas supplier. No doubt one principal cause of the complaints is that pointed out by Mr. Hawkins—viz., the bad burners and fittings in use in Wigan and, as we mentioned last week, in Leeds. Apart from these considerations, however, a knowledge of human nature has taught us that a great number of men take no notice of their expenditure. Lots of people will tell you that they have no knowledge how their money goes, and no idea what becomes of their wine and spirits, the simple fact being that they have spent the one and drunk the other. It is much the same with regard to gas. No notice is taken of consumption until the inevitable bill comes in, and then follows an unreasonable uproar like that now raised in Wigan.

The undertaking of the Penrith Gas Company will soon pass into the hands of the Local Board, who have applied for a Provisional Order, which the Gas Company do not oppose.

The Corporation of Worcester and the Gas Company are at the present moment at loggerheads, for reasons which the information before us does not enable us fully to comprehend. It seems, however, to be a question as to the propriety of the present charge for public lights, and we rather think that a small concession on the part of the Company would make matters smooth. There are, of course, the usual threats of competing works and a compulsory purchase, but these the Company may laugh at.

GAS BILLS FOR 1877.

The following twelve Bills are to authorize the incorporation of, and to confer statutory powers on, Gas Companies, all of whom, with two exceptions, have works in operation.

The *Bishop Auckland District Gas Bill* is to incorporate the Bishop Auckland Gas Company, formed in 1846, with a nominal capital of £13,960, of which £8376 has been paid up. This Bill asks power to raise additional capital to the amount of £66,040, the dividends on which are to be limited as usual. As the Company have at present no mortgage debt, the usual borrowing power is prayed for in respect of both original and new capital. Gas of fourteen-candle power, tested by Sugg's "London" Argand, No. 1, is to be supplied, at a maximum charge of 5s. per 1000 feet. No conditions of purity are proposed beyond those which are imposed by the general Act of 1871.

The *Carshalton Gas Bill* is, first of all, to incorporate the

Carshalton Gas and Coke Company, Limited, formed in 1857, with a nominal capital of £50,000, all of which has been subscribed, and £27,500 paid up. The Bill asks power to raise additional capital to the amount of £50,000, and as the Company have at present no debt, the usual borrowing power is sought in respect of both old and new capital. The Bill proposes a supply of thirteen-candle gas, tested by Sugg's "London" Argand, No. 1, at a charge not exceeding 6s. per 1000 feet. The Bill further seeks power to transfer the undertaking to, or amalgamate it with, that of the Croydon Commercial Gas Company, on terms and conditions which seem to have been arranged, but which are not set forth in the Bill. Necessarily the Croydon Company, if the amalgamation be effected, will take over all the powers conferred by this Bill, if it should pass.

The *Christchurch Gas Bill* is to incorporate the Christchurch Gas Company, Limited, formed last year, with a nominal capital of £50,000, one-half of which has been subscribed and fully paid up. Power is sought by this Bill to raise additional capital to the amount of £25,000, the dividends on which will be limited as usual. The Company have no mortgage debt, and they only seek the usual borrowing power on the original capital already raised, and to a like extent on the additional. The Bill proposes to supply fourteen-candle gas, at a charge not to exceed 7s. per 1000 feet.

The *Coatbridge Gas Bill* is to incorporate the Coatbridge Gaslight Company, formed in 1843. The present capital of the Company is £7590, raised in three pound shares, all fully paid. The Company have also expended on the undertaking £10,120 and upwards out of profits applicable to dividend. These two sums the Bill proposes shall be converted into consolidated stock, and distributed among existing proprietors, at the rate of seven pounds for each three pound share. It is also proposed to raise additional capital to the amount of £32,290, by ten pound shares, of course, and with the usual limitations as to dividends. The usual borrowing powers are sought in respect of original stock and additional capital. Twenty-candle gas is to be supplied (Coatbridge is in the county of Lanark), tested by a union jet burner. The price is not to exceed 6s. 8d. per 1000 feet.

The *Colne Gas Bill* is to incorporate the Colne (Lancashire) Gas Company. The Company, or "Society," as it is called, was formed in 1838, and the members have spent £15,000 on the undertaking. This Bill proposes to allot the original capital among those who are the actual proprietors of it, and then seeks power to raise an additional £15,000, the dividends on which are to be limited as usual. The usual borrowing powers are sought. It is proposed to supply fourteen-candle gas, at a price not to exceed 5s. 6d. per 1000 feet.

The *Epsom and Ewell Gas Bill* is to incorporate the Epsom and Ewell Gas Company, Limited, constituted in 1839, under a deed of settlement, and now having a paid-up capital of £24,000, and a mortgage debt of £4800. It is proposed in this Bill to raise additional capital to the amount of £30,000, with the usual limitations as to dividend, and to exercise the usual borrowing power. Fourteen-candle gas is to be supplied, at a price not to exceed, within the parishes of Epsom, Ewell, and Banstead, 6s. 6d. per 1000, and not more than 7s. beyond such limits.

The *Limerick Gas Bill*, one of the exceptions alluded to above, is to incorporate a new Company, with power to acquire the gas undertakings of the United General Company and the Corporation of Limerick. The most important statement in the preamble is that neither of the gas undertakings in the City of Limerick is subject to statutory regulations. The capital proposed for the new Company is £70,000, carrying the usual borrowing powers. No terms of purchase have been agreed upon with either the Corporation or the United General Company. The new Company propose to supply fourteen-candle gas, at a price not exceeding 5s. 6d. per 1000 feet.

The *Londonderry Gas Bill* is to incorporate the Londonderry Gaslight Company, formed in 1829. The present nominal capital is £36,000, which is deemed fully paid up. This Bill seeks authority to raise £24,000 of new capital, with the usual restrictions as to dividends. As the Company have no mortgage debt, borrowing power to the usual extent is sought in respect of both old and new capital. It is proposed to supply fourteen-candle gas, at a price not to exceed 6s. per 1000 feet.

The *North Dock Ward (Dublin) Gas Bill* is another measure to incorporate a new Company, with power to manufacture and supply gas within an insignificant portion of the City of Dublin. The capital proposed for the Company is £32,000, in respect of which the usual borrowing power is sought, but no money is to be borrowed until the whole amount of capital is subscribed, and one-half paid up. The Bill proposes a supply of sixteen-candle gas, tested by Sugg's "London" Argand, No. 1, at a price not exceeding 3s. 6d. per 1000 feet. It also asks that two years may elapse before the Company are compelled to institute a testing-station at their works.

The *Sittingbourne Gas Bill* is to incorporate the Sittingbourne District Gas Company, formed to take over the undertaking started in 1846 by Mr. George Smeed. The consideration is to be settled by agreement or arbitration. The capital proposed for the Company is £30,000, carrying, of course, the usual borrowing power. Gas of fourteen-candle power is to be supplied, at a price not to exceed 6s. per 1000 feet.

The *Southend Gas Bill* is to incorporate the Southend Gas Company, originally formed in 1854, with a nominal capital of £10,000, of which £9000 has been subscribed and fully paid up. The Bill seeks authority to raise another £10,000, and to exercise the usual borrowing power. Gas of fourteen-candle power is to be supplied, at a price not exceeding 6s. per 1000 feet.

The *Tudhoe and Sunderland Bridge Gas Bill* is to incorporate a Gas Company of the same name, which is formed to take over the gas undertaking of the Weardale Iron and Coal Company, which now supplies Tudhoe. The capital of the Company is to be £28,000, one-half of which is to be deemed stock fully paid up, and is to be vested in the proprietors of the Weardale Iron and Coal Company, and the other half is to be raised as usual by the issue of £10 shares. There is a provision that these shares may be divided into preferred and deferred half shares, with the usual consequences. The usual borrowing power is sought in respect of both capital stock and new capital. It is proposed to supply gas of twelve-candle power, at a price not to exceed 5s. per 1000 feet.

It is hardly necessary to state that in all the Bills above mentioned, which are promoted to incorporate companies already in existence, the necessary provisions are made for the transference of the undertaking to the newly constituted Company, with all liabilities. In many cases it is proposed that borrowed money shall be converted into stock, at a low rate of dividend. In all it is proposed that money received on deposit shall be entitled to interest at the rate of five per cent. Whenever not mentioned, it must be understood that the test burner is Sugg's "London" Argand, No. 1.

The following Bills are promoted by Gas Companies already incorporated, to obtain further powers:—

The *Alliance and Dublin Gas (Bray Supply) Bill* is to enable the Company to acquire some additional lands on which to erect new works. No further capital is asked for.

The *Ashton under Lyne Gas Bill* is to enable the Ashton Gas Company, with a present paid-up capital of £47,700, to raise £50,000 in addition, with the usual borrowing power in respect of it. The dividends on the new capital are, of course, to be limited to the now universal rates. The general Act being incorporated, the proposed illuminating power is fourteen candles, Sugg's "London" Argand, No. 1, being the test burner.

The *Bristol United Gas Company's Bill* is merely to enable the Company to make some re-arrangement of the roadway in the neighbourhood of the works.

The *Croydon Commercial Gas and Coke Company's Bill* is to authorize the Company, whose present share and loan capital amounts to £149,100, nearly the whole of which has been expended, to raise further capital to the extent of £120,000, and to borrow in the usual proportion. All past mortgage debts have been converted into capital; if any further conversions be made, this Bill fixes the rate of dividend payable on the stock at five per cent. The Bill contains sections to authorize the purchase of, or amalgamation with, the Carshalton Gas Company. If such purchase or amalgamation be effected, the united Company will be known as The Croydon and Carshalton Gas Company.

The object of the *Crystal Palace District Gas Bill* has already been mentioned in our "Circular," as also that of *The Gaslight and Coke Company's Bill*.

The *Leicester Gas Bill* is promoted by the Leicester Gas Company, first of all to obtain an extension of their limits of supply, and then authority to raise further capital. The present capital of the Company is £220,000, raised in three several sums, under the authority of three separate Acts of Parliament, which conferred the usual borrowing powers in respect of the capital authorized. The debt of the Company, however, appears to be exactly £1000. By this Bill power is sought to raise further capital, not exceeding £250,000, carrying, of course, the usual borrowing power. The Bill is, further, to authorize the purchase of over thirty-three acres of land, and the construction of works thereon for the purposes of the Company.

The *Louth Gas Bill* has already been noticed in our "Circular," and need only be briefly alluded to here. The Bill is to repeal the original Act of the Company, passed in the early

days of gas lighting, to re-incorporate the Company, to give power to capitalize expended profits under the name of improvement stock, and to enable the Company to raise £20,000 additional, with borrowing powers in the usual proportion. Necessarily, the Bill contains all the provisions common to modern gas legislation. Fourteen-candle gas is to be supplied, and the charge is not to exceed 5s. 10d. per 1000, a discount of fifteen per cent. being allowed for prompt payment.

The *Newport (Monmouthshire) Gas Bill* is simply to enable the Newport Gas Company to acquire land on which to erect new works. No further capital is applied for.

The *Stretford Gas Bill* is to authorize the Stretford Gas Company, incorporated in 1862, with a nominal capital of £39,000, of which £38,000 has been raised and expended, to enlarge their existing works. For this purpose the Bill asks power to raise additional capital to the amount of £61,000, by the issue of *five pound* shares. This capital is to carry the ordinary borrowing power, the dividends on it being limited as usual.

The *Thanet Gas Bill* has been referred to and described in our "Circular." It is to authorize the capitalization of expended profits, to give power to raise additional capital to the amount of £32,000, and to confer borrowing powers in respect of the original capital, the improvement stock, and, of course, the additional capital. Gas of fourteen-candle power is to be supplied, and the price is not to exceed 5s. 6d. per 1000 feet.

The *United General Gaslight Company (Limerick Undertaking) Bill* is to dissolve the original Company and re-incorporate them with extended powers. The preamble recites the history of the Company from their formation in 1830, under letters patent, with a nominal captal of £500,000, and power to make and sell gas, and deal in stocks and shares, down to the Act of 1866, which left them with only the Limerick undertaking, and a nominal capital of £36,000. This Bill is to enable the reconstructed Company to raise a further sum of £24,000, with power to borrow to the usual extent in respect of both original and new capital. Gas of fourteen-candle power is to be supplied. The dividends are to be regulated by a sliding scale, as provided for in the recent Metropolis Gas Acts, the initial price at Limerick being 5s. per 1000 feet. The Bill is also to enable the Company to acquire the gas undertaking of the Corporation of Limerick, and in the event of the purchase being effected, to authorize the Company to raise further capital to the amount required to pay the purchase-money.

The *Wakefield Gas Bill* is to empower the Wakefield Gas Company, having at present a paid-up capital of £80,000, to raise additional capital to the amount of £75,000, carrying the usual borrowing power. All the money the Company have had power to borrow under their previous Acts has been raised by the issue of shares; but, of course, a clause in this Bill will prevent a repetition of this proceeding. Gas of 14-candle power is to be supplied, and the bill proposes that, after the expiration of two years, the Company shall be compelled to maintain the pressure now usually prescribed. The dividends on the new capital are, of course, limited to the usual rates.

The *Waterford Gas Bill* is to enable the City of Waterford Gas Company, with a present declared capital of £16,000, to capitalize expended profits to the amount of £4000, and to raise additional capital to the amount of £16,000, with the usual borrowing power. The new shares will be denominated C shares, and the Bill proposes to limit the dividend payable on them to eight per cent. From and after the *25th of June*, 1886, the Company propose to supply 14-candle gas, tested by Sugg's "London" Argand, No. 1, and they offer to fit up, within three months after the date mentioned, a room at the works, where the gas can be tested. The date mentioned is that on which the agreement of the Company with Mr. George Anderson will terminate.

The *Woolwich, Plumstead, and Charlton Gas Consumers Bill* is to authorize the Company, having at present an expended share capital of £60,000, to raise another £60,000. As the Company raised the money they were authorized to borrow under previous Acts by the issue of shares instead of loans, this Bill is to empower them to borrow £30,000 in respect of their entire capital.

SALE OF GAS SHARES.—On the 6th inst., 24 shares (£12 10s. each, fully paid) in the Abingdon Gaslight and Coke Company were submitted to sale by auction in that town, and realized upon an average £22 10s. each.

EXPLOSION OF GAS AT BRADFORD.—On the 3rd inst., as some workmen belonging to the Corporation Gas-Works were engaged in laying mains under the footway in the Manchester Road, and were making a connexion with the service-pipe to the shop of Mr. T. W. Wade, stationer, there was a loud explosion. The window, in one large sheet of glass, was blown out, the stock was set on fire, and Mrs. Wade was burned about the neck and arms, but not seriously. The fire was quickly extinguished, and no further damage was done. The man who was connecting the pipe states that he had no light, and the cause of the explosion, which at first caused great alarm, is not clear.

Communicated Article.

ANALYSIS OF COAL GAS.

By A. W. WILKINSON, M.D.,
Chemist to the Mutual Gaslight Company, New York.

To make an analysis of coal gas by any of the well-known processes is a task of such a magnitude that few, if any, engineers of our gas-works care to undertake it; and yet how often would they be glad to know, even approximately, the composition of this mixture of gases.

I propose in this article to give a short and ready method of a qualitative and quantitative analysis of gas—one so easy of manipulation that it will come within the reach of any one at all skilled. Although it does not claim to the greatest degree of accuracy, yet, with care, a satisfactory result may be obtained, and that, too, within a very short time; in fact, the principal gases only require a few minutes for their separation.

I give here a list of the gases found in coal gas, so that we can better keep them in mind:—

Ammonia.
Sulphuretted hydrogen.
Carbonic acid.
Air, or oxygen and nitrogen.
Bisulphide of carbon.
Olefiant gas.
Acetylene, &c.
Carbonic oxide.
Light carburetted hydrogen.
Hydrogen.

The first four of the gases in the list, although often present in well-made gas, are generally considered impurities, and, by rights, should not be there.

It is not my object to discuss this subject, but to give a sure and easy mode of detection. The usual test for ammonia (red litmus or turmeric paper) is too crude to detect its presence, even though it may be present to a considerable amount. I much prefer litmus water, which may be readily made by boiling a few cubes of the litmus in water for a minute or two, then filtering the liquid. It should have a bright blue transparent colour, not too dark; to this add a fraction of a drop of some weak acid, such as acetic or hydrochloric; this will change the colour to a wine red, and, if sufficiently diluted, will be capable of detecting the smallest trace of ammonia.

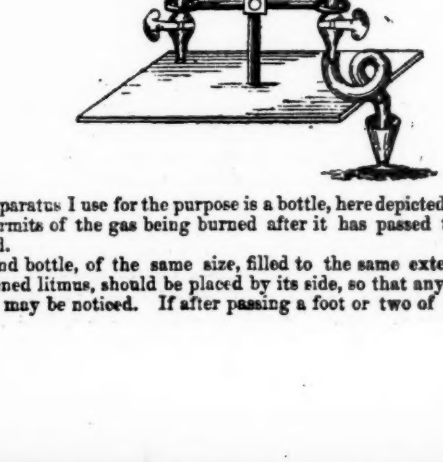


Fig. 1.

Fig. 2.

The apparatus I use for the purpose is a bottle, here depicted (fig. 1), which permits of the gas being burned after it has passed through the liquid.

A second bottle, of the same size, filled to the same extent with the reddened litmus, should be placed by its side, so that any change in colour may be noticed. If after passing a foot or two of the gas,

the colour does not change to blue, it may safely be pronounced free from ammonia.

The same apparatus (when partly filled with lime water) answers excellently well for detecting carbonic acid, the white precipitate of carbonate of lime being characteristic. Also for sulphuretted hydrogen, when partly filled with a solution of acetate of lead; the brown or black precipitate of sulphide of lead indicating this gas.

The presence of acetylene may be readily proved by partly filling the apparatus with a solution of the subchloride of copper in ammonia; the red precipitate of the acetylide of copper, which when heated explodes, shows this gas.

For a quantitative analysis, I make use of a graduated burette, with a stopcock at the tip, the tip ground to fit a funnel of an inch in diameter and four inches long. The drawing (fig. 2) gives a good idea of this instrument with the stoppered funnel to stand it in.

For convenience in working, the tube should be 2½ feet in length, five-eighths of an inch in diameter, and divided into 100 parts. To fill this with water, place it in the funnel, secure both to the stand, as in drawing, and then pour into the funnel sufficient water to fill the tube and a little over. Having fitted a flexible tube to the tip, open the stopcock, and by exhaustion fill the tube with water, without changing its temperature by handling; when completely filled, close the stopcock, and now we are ready to introduce the gas for analysis. Care must be taken to have the gas and water, as well as the reagents we use, of the same temperature as the room.

A second tube of like size should also be filled and placed by its side. The two may now be filled to the O point, by putting on the tip an india-rubber tube, through which is flowing the gas to be examined. By opening the stopcock, the gas is allowed to enter as the water flows out, at the same time avoiding any absorption the gas might suffer by passing through water.

The second tube, filled in the same manner, serves to note any change of temperature. The funnel previously described is now placed on the tip, which permits us to introduce any absorbent we wish; by simply opening the stopcock, it will flow down and expose an enormous surface to the gas. A minute is sufficient for the absorption. A little liquid should always be left in the funnel to prevent the introduction of air.

For the absorption of ammonia, use dilute sulphuric acid; the rise of the water in the tube will in a few minutes indicate the per centage of this gas.

For sulphuretted hydrogen, a solution of arsenious acid (this may ollow the previous test); the further rise of the water in the tube indicates the per centage of this gas.

For carbonic acid, use a solution of caustic potass. A small quantity of this solution will readily absorb carbonic acid, and may follow the preceding test; the rise of the water in the tube indicates the per centage of this gas.

For bisulphide of carbon, a solution of iodine in water (made by boiling iodine in distilled water), followed by a solution of caustic potass; the rise of the water in the tube indicates the per centage.

For air, use pyrogallate of potass, made by dissolving pyrogallic acid in a solution of caustic potass; this may follow the preceding test, and will absorb oxygen. As oxygen is but one-fifth of the air, we have to multiply the rise of the water in the tube by five, to give the correct amount, or we may say so much oxygen and four times its amount of nitrogen.

For olefiant and acetylene gases, and other hydrocarbons, I prefer bromine; yet Nordhausen oil of vitriol may be used. A few drops of bromine placed in the funnel with a little water on the top may be gradually introduced by turning the stopcock; as it flows down, the tube becomes filled with the vapour of bromine. This in the sunlight will in a few seconds absorb the illuminating gases; in ordinary light a few minutes are required.

The bromine should be followed by a solution of caustic potass, which will leave the tube perfectly clear, and the rise of the water will indicate the per centage of the illuminating gases.

For carbonic oxide, employ a saturated solution of the subchloride of copper in strong hydrochloric acid; this may follow the preceding test, after the tube has been thoroughly washed with water of the caustic potass previously used. This solution will quickly dissolve carbonic oxide; it should be followed by water and caustic potass, to dissolve hydrochloric acid vapours; and a further rise of water in the tube indicates the per centage of this gas.

We have now left a mixture, hydrogen and light carburetted hydrogen and the nitrogen of the air. As these gases serve only to dilute, having no light-giving qualities, it is not important to separate them. In reading the amount of absorption, fill the funnel with water so that the liquid inside of the tube stands at the same level as the water in the funnel outside.

Avoid handling the tube containing the gas; that is, take hold of the stopcock only when moving it.

If the gas has not undergone expansion or contraction in the second tube, your readings will be approximately correct.

I have found the apparatus so simple and so easily handled, and the analysis so satisfactory, that I now depend upon it entirely. Several times I have compared the results with the usual eudiometric analysis, which takes several hours and the greatest care in manipulation, and find I can produce equally good results.

My greatest difficulty has been in the choice of reagents. To find a reagent that will dissolve a single gas, leaving the other gases for those reagents which follow, has been no small task. Take, for instance, the absorption of bisulphide of carbon, the one mentioned is the only practical substance that will dissolve this compound without, at the same time, taking some of the hydrocarbons.

Again, they must follow in a certain order. If, for instance, we use bromine in testing for the amount of illuminating gas in common coal gas, containing, as it does, ammonia, carbonic acid, bisulphide of carbon, they, as well as the illuminating gas, will be absorbed, and will add to the apparent richness. This mistake has often been made.

The apparatus will be found useful in examining the coal gas in the different stages of its generation, as well as in the various steps of its purification.

Analysis of gases from other sources can be readily made with this apparatus. Those skilled will at once appreciate its application.

I hope that the process herein described may be of some little service to your numerous readers.

College of the City of New York, Jan. 22, 1877.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXXVIII.

Main-Pipes (*continued*).

In ground whose surface is perfectly level, mains should be laid with a slight inclination, a fall of about 12 inches in 200 yards being amply sufficient. At the lowest point of the incline thus given to the line of mains, a cast-iron syphon or drip-well, fig. 46, should be

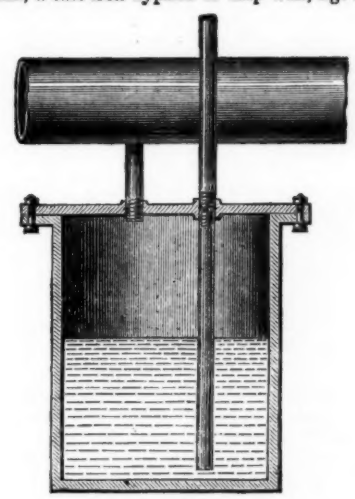


Fig. 46.

sunk at such a depth below the under side of the main that a pipe having its ends attached to the one and to the other will convey the water or other liquid contained in the mains, and due to condensation or other causes, into the drip-well, from which it is periodically removed by means of a small hand-pump attached to another pipe passing through the cover of the well, and dipping to within 1½ inch or 2 inches of the bottom, the opposite end rising to the surface of the ground, being plugged, and protected by means of a cast-iron cover with hinged lid. For the smaller sizes of pipes up to 4 inches diameter, the drip-box or syphon-well, with two sockets cast on, as in fig. 47, is the most convenient for use. The wrought-iron pipe

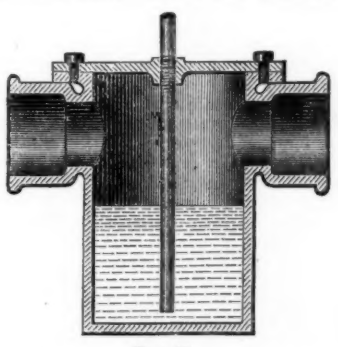


Fig. 47.

which rises to the surface of the ground, and to which the syphon-pump has to be attached, should be secured to the cover by a left-handed screw-thread. This it necessary, because the plug or cap which closes the pipe at the upper end is apt to set fast with rust in the intervals of inspection; and the force necessary to turn it when in that condition, if the thread is of the ordinary description, is often sufficient to cause the unscrewing of the pipe from the cover underneath.

All syphon-wells, when completed and ready for fixing, should invariably be proved at the gas-works, under pressure. If gas be used for that purpose, the precaution should be taken of expelling the air before applying a light to the joints. Fatal accidents have occurred by heedlessness in this respect, the gas and air having formed an explosive mixture.

The principal point requiring attention in the fixing of syphons is the placing of them level on a solid foundation, so that there may be no danger of settlement, resulting, in the first instance, in the

drawing of the connecting-pipe, and, in the second, in fracture of the main. In loose and sandy soils a good flag should be placed at the bottom of the trench or pit, and well bedded, for the cast-iron pot to rest on.

The cost of laying mains will vary somewhat in different places, hence it is impossible to state a price that will apply in all cases. The following tables, however, may be taken as giving about the average cost throughout the country:—

TABLES, *showing the Average Cost per Yard of Laying Mains, 9 feet long each, with Turned and Bored Joints, and with Lead Joints, including the Total Expense of Material (the Pipes excepted), Excavating, Reinstating, and Maintaining the Ground for Six Months after completion. Average Depth from the Surface of the Ground to the Upper Side of the Pipes, 1 foot 9 inches.*

Diameter in Inches.	2		2½		3		4		5		6		7		8	
Description of Joint.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.	Turned and Bored.	Lead.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In ordinary ballast	0 8	1 0	0 9	1 1	0 10	1 2	1 3	1 7	1 6	2 0	1 7	2 2	1 10	2 6	2 1	2 10
In roads macadamizd. with Welsh or limestone	0 11	1 3	1 0	1 5	1 2	1 6	1 7	1 11	1 9	2 4	1 11	2 6	2 2	2 10	2 5	3 2
In ordinary paved streets	1 0	1 4	1 1	1 6	1 4	1 8	1 8	2 0	2 1	2 7	2 3	2 10	2 5	3 1	2 8	3 5
In bitumenized streets	3 2	3 6	3 3	3 9	3 6	4 2	5 0	5 6	5 3	6 0	5 7	6 2	5 10	6 9	6 1	7 2
In footpaths made with sand or ashes	0 6	0 11	0 7	1 0	0 8	1 0	0 11	1 3	1 4	1 10	1 5	2 0	1 7	2 3	1 11	2 8
In footpaths flagged	0 8	1 0	0 9	1 1	0 10	1 2	1 3	1 7	1 6	2 0	1 7	2 2	1 10	2 6	2 1	2 10
In footpaths asphalted	1 10	2 2	2 0	2 4	2 2	2 8	2 7	3 0	2 10	3 4	2 11	3 6	3 2	3 10	3 5	4 3

Diameter in Inches.	9		10		11		12		13		14		15		16	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In ordinary ballast	2 2	3 0	2 6	3 6	2 8	3 10	2 11	4 2	3 3	4 9	3 5	5 2	3 9	5 7	4 4	6 5
In roads macadamizd. with Welsh or limestone	2 6	3 4	2 10	3 10	3 1	4 3	3 4	4 7	3 8	5 2	3 10	5 7	4 2	6 0	4 9	6 10
In ordinary paved streets	2 9	3 7	3 1	4 1	3 4	4 6	3 7	4 10	3 11	5 5	4 1	5 10	4 5	6 3	5 0	7 1
In bitumenized streets	6 2	7 6	6 6	8 0	6 8	8 4	7 11	9 8	8 3	10 3	8 5	10 8	9 0	11 4	9 8	12 3
In footpaths made with sand or ashes	2 0	2 10	2 4	3 4	2 6	3 8	2 9	4 0	3 0	4 7	3 3	5 0	3 7	5 5	4 2	6 3
In footpaths flagged	2 2	3 0	2 6	3 6	2 8	3 10	2 11	4 2	3 3	4 9	3 5	5 2	3 9	5 7	4 4	6 5
In footpaths asphalted	3 6	4 4	3 10	4 10	4 0	5 2	4 4	5 7	4 9	6 3	5 0	6 9	5 3	7 1	5 10	7 11

Diameter in Inches.	17		18		19		20		21		22		23		24	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In ordinary ballast	4 8	7 0	5 0	7 5	5 8	8 2	6 3	8 10	6 8	9 4	7 1	9 9	7 4	10 0	7 7	11 2
In roads macadamizd. with Welsh or limestone	5 2	7 6	5 6	7 11	6 2	8 8	6 9	9 4	7 2	9 10	7 7	10 3	7 10	10 6	8 1	11 8
In ordinary paved streets	5 4	7 8	5 8	8 1	6 4	8 10	7 0	9 7	7 5	10 1	7 10	10 6	8 1	10 9	8 4	12 0
In bitumenized streets	10 0	12 10	10 6	13 6	11 10	15 2	12 6	16 0	13 0	16 6	13 6	17 0	13 8	17 3	14 0	18 6
In footpaths made with sand or ashes	4 6	6 10	4 10	7 3	5 6	8 0	6 0	8 7	6 6	9 2	6 10	9 6	7 2	9 10	7 4	11 0
In footpaths flagged	4 8	7 0	5 0	7 5	5 8	8 2	6 3	8 10	6 8	9 4	7 1	9 9	7 4	10 0	7 7	11 2
In footpaths asphalted	6 2	8 6	6 6	9 0	7 2	9 9	7 9	10 4	8 2	10 10	8 7	11 3	8 10	11 6	9 1	13 8

From properly-laid and well-jointed mains the leakage is but small, and continues to be so, unless disturbance from subsidence or upheaval (by frost) of the ground takes place.

One of the most prolific causes of leakage with which a gas manager has, at one time or another, to contend, is the opening and undermining of the streets for sewerage purposes. In the construction of such works not carefully undertaken and carried out, the destruction they cause to the pipes is incalculable; and the effects are not confined to the period of the work being performed, but are felt for months after its completion. They are the occasion of damage to the mains and loss of gas, even when the greatest care and the best appliances are used in their execution. We have known more than one instance of a system of pipeage, in a previously satisfactory state, utterly disorganized by such operations, and it is always a wise economy, when these works are being carried out in a district, for the gas authorities to take the precaution of appointing a trustworthy person to devote his time to protecting, as far as possible, their property from damage, by endeavouring to secure the solid filling up and ramming of the soil in all places where the sewers or drains have been formed underneath or near to the line of pipes, and when the latter has been undercrossed at right angles. But even when the utmost care has been exercised, breakages and drawing of the joints will occur.

In the worst evils, however, there are compensatory circumstances; and in the course of sewerage and draining operations, opportunities are afforded for the discovery of leakages which, though not heavy in character, may have been in existence for a lengthened period. All wrought-iron service-pipes that exhibit signs of active corrosion on being uncovered under such circumstances, should be renewed, as, owing to the disturbance and exposure of the pipes for a time to the air and moisture, their oxidation would, if they were allowed to be covered in, proceed with renewed rapidity.

A very simple and effective method of discovering the vicinity of a heavy leakage is to drive a steel bar into the ground at short intervals near to the line of pipes, taking care, of course, not to injure the main. In nineteen cases out of twenty the escaping gas will issue from the hole on the withdrawal of the bar, and thus much unnecessary opening of the ground may be avoided.

(To be continued.)

PROPOSED PURCHASE OF THE EDGWORTH GAS COMPANY.—A meeting of the Bolton Gas Committee was held on Friday last, at which the chairman and the vice-chairman were authorized to negotiate with the Edgworth Gas Company for the purchase of their plant conditionally, on power being obtained by the corporation to supply that township with gas.

REDUCTIONS IN THE PRICE OF GAS.—The directors of the Kidderminster Gas Company have issued a circular, in which they state that, "following the policy adopted in January, 1876, the directors desire that the consumers shall again participate in the benefit of the success which has attended the working of the past year; they have, therefore, resolved to make a further reduction in the price of gas. From and after the 1st of January, 1877, the prices will be as follows:—Consumers under 50,000 feet per quarter, 3s. 6d. per 1000 feet (reduction, 3d.); consumers above 50,000 and under 250,000 feet, on such quarter, 3s. 5d. per 1000 feet (reduction, 2d.); consumers above 250,000 feet on such quarter, 3s. 3d. per 1000 feet (reduction, 2d.)."

Correspondence.

STREET-LAMP LIGHTING.

SIR,—The local board of the town in which I reside are now engaged in laying water-pipes, and they have determined at the same time to lay down a new main expressly for the supply of gas to the public lamps. The whole of this gas will be registered through one meter. I believe the gas company approve of the scheme.

I should be glad to know whether this method has been adopted in any other place, and, if so, with what success. I reserve further remarks on the scheme. W. M. A.

LOSS OF METERS, ETC., BY FIRE.

SIR,—Will you favour me by allowing me to request some of your readers to kindly inform me—What is the usage in other companies in cases where meters, fittings, or stoves, let on hire, are destroyed by fire on the premises of the consumer who has them in use? My company have recently lost several meters in that way, and I am uncertain whether we shall be likely to succeed in proceeding for the recovery of the value from the persons who rented them of the company, and in whose charge they were at the time they were destroyed. Have any similar cases been legally decided, and, if so, with what result?

SECRETARY.

SPONGY IRON WATER FILTRATION.

SIR,—In your number of the 6th inst., I see a reference to my method of purifying water by means of spongy (metallic) iron. Allow me one remark. Dr. Frankland certainly recommended animal charcoal as long as it was—notwithstanding its well-known objectionable properties—the best filtering medium known. I think I may even say, that when, as one of the Commissioners on Rivers Pollution, his attention was drawn to spongy iron, he made the first experiments with considerable distrust; but when he satisfied himself, conclusively, of the purifying value of that material, he could not but acknowledge its superiority.

If the writer of the article desires information about spongy iron, and will favour me with a call, I shall, with pleasure, give him every explanation, and place all means at his disposal to satisfy himself about its merits as a purifying medium for water. GUSTAV BISCHOF.

Analytical Laboratory, 4, Hart Street, Bloomsbury, London, W.C., Feb. 9, 1877.

[We have never come across any recantation by Dr. Frankland of his opinion as to the purifying action of animal charcoal. Our correspondent has probably forgotten that about two years ago he promised to send us a specimen of his spongy iron and filter for experiment.—ED. J. G. L.]

A HINT TO JOINT-STOCK GAS COMPANIES.

SIR,—As many companies registered under the Act of 1862 have not kept up their registration by sending to the Registrar "once at least in every year," a list of the names, addresses, and occupations of all their shareholders, and have thus become liable to heavy penalties at the instance of any common informer, I shall feel obliged if you will allow me to say that where companies have not an agent in town to whom they can entrust this matter, I shall be happy to undertake it for them, and give any information that may be required. W. LIVESEY.

Gas and Water Companies Association, 6, Victoria Street, Westminster Abbey, S.W., Feb. 9, 1877.

PROPOSED CATALOGUE OF GAS COMPANIES.

SIR,—I send herewith a copy of a circular and specimen of the lists referred to therein, which I have recently sent, at the instance of the Association, to all the companies named in the list.

In reply, I have received much information that I should have been glad to acknowledge in each case; but as that is impracticable, I shall feel obliged if you kindly permit me to do so generally through your JOURNAL.

It is, of course, intended that both the details and results shall be at the service of the companies when complete. W. LIVESEY.

Gas and Water Companies Association, 6, *Victoria Street, Westminster Abbey, S.W., Feb.* 9, 1877.

[ENCLOSURE.]

5 & 6, *Victoria Street, Westminster, Dec.* 5, 1876.

Sir,—The committee of this Association, being of opinion that the large amount of capital invested in the different gas undertakings in the United Kingdom, and the great quantity of coals used for gas purposes, are but little understood, and that if these facts could be ascertained the large interests involved in the "manufacture of gas" would be better appreciated, and that as there are no official records from which the information can be procured, the committee would be doing good service to the companies to have it ascertained, they have decided to make special application to the manager of each separate undertaking, whether in the hands of a local authority or a company, for the information necessary for the purpose, and to have it worked out.

To do this effectually it was found necessary, as a preliminary step, to prepare a list of all the gas undertakings in operation at the present time; and this has been done with great care from the best official sources of information that could be obtained—viz., the indices of all the local and personal Acts passed by Parliament in the present century, and the annual returns presented to Parliament by the Registrar of Joint-Stock Companies of all the companies registered under the Companies Acts of 1844 and 1862.

From the first of these sources the names of all the companies and local authorities to whom statutory powers for the supply of gas have been granted have been taken; and from the second the names of all the companies that have been registered as gas companies, or gas and water companies, except such as have subsequently obtained statutory powers.

The first gas Act granted to a company is The Gaslight and Coke Company's Act (now the Chartered), 1810, and the first Act to a corporation, the Manchester Act, 1824.

The names of the companies having statutory powers will, it is hoped, be found tolerably correct; but the names of the local authorities may probably require amendment, inasmuch as it has been assumed that whenever a local authority have obtained parliamentary power either to purchase any existing works, or to construct others, they have exercised that power, and that in all cases where the local authority have the supply in their own hands they are under statutory regulations; but it is now supposed that there are some exceptions to this.

In addition to the foregoing, there are many other undertakings belonging either to companies not registered or to private individuals, of which the committee have no means of obtaining reliable information, such information as the lists contain having been taken from the JOURNAL OF GAS LIGHTING.

The lists were, in the first instance, arranged in alphabetical order throughout, with the intention of sending a complete list to the manager of each undertaking, and asking him to furnish the information required in his own case, and, at the same time, to look over the list and make any correction that might appear to him necessary or desirable; but, on further consideration it was found that this would not only be much too costly as a preliminary proceeding, but would require more time and attention from the respective managers than they might be able to give to it; and that, if done at all, under such circumstances it would, in all probability, be done but very imperfectly.

The lists have therefore been re-arranged and placed in alphabetical order in counties, each county by itself, as being more within the local knowledge of the different managers, and, consequently, less trouble for them to correct, as well as less costly to the Association.

I now send you two copies of the list as complete as we have been able to make it for your own county, and respectfully request, on behalf of the Association, that you will kindly give your aid in forwarding the object they have in view, by looking over the list and making any correction or supplying any omission that may occur to you, and filling up the particulars of your own case in one copy, and returning it to me as addressed at the back, retaining the other copy for your own use.

I am, Sir, yours very faithfully,
W. LIVESEY, Secretary.

To the Manager of the Gas-Works at ——

N.B. The lists will be published when completed.

The following is a summary of the number of companies in England, Scotland, and Ireland, as the list at present stands, viz.:—

	Local Authorities.	Companies with Parly. Powers.	Other Companies.	Totals.
England	102 ..	304 ..	835 ..	1241
Scotland	18 ..	4 ..	234 ..	256
*Ireland	14 ..	3 ..	88 ..	105
	134 ..	311 ..	1157 ..	1602

* This is doubtless very defective.

RICHMOND WATER SUPPLY.—It is reported that the difficulty experienced by the vestry in obtaining water from the old artesian well in the lower road has been overcome. Last Thursday morning one of the workmen descended the well to a depth of nearly 200 feet, where the boring commences, and having probed the pipe to a depth of about 40 feet, succeeded in clearing some obstruction, the consequence being that the water came rushing up in such volumes as to drown all the pumping apparatus, and cause the man making the experiment to beat a hasty retreat. The water ran rapidly to within 20 feet of the surface, or nearly 100 feet above the highest pump. As there is no prospect of recovering the submerged pumps, a new one of greater power has been obtained for fixing nearer the surface. The well proper is 7 feet in diameter and 200 feet deep, and the boring about 200 feet below that. The supply from this source alone is now estimated at from 250,000 to 300,000 gallons per 48 hours, giving 20 gallons per diem for every inhabitant, besides which there are private wells in use, at premises where water has never been laid on, sufficient to supply 5000 people at least. As the vestry have secured the use of the old artesian well for six months, there is little fear of the supply again running short before the completion of the new artesian well belonging to the vestry, which is progresing favourably.—*Standard.*

Parliamentary Intelligence.

HOUSE OF COMMONS.

THURSDAY, FEB. 8, 1877.

On the motion of Mr. EDWARD STANHOPE, a copy was ordered of "Report by the Board of Trade upon all the Railway, Canal, Tramway, and Water Bills of Session 1877."

Mr. ALEXANDER BROWN gave notice that, on going into committee of supply, on Friday the 16th of February, he would call attention to the state of the water supply for domestic purposes in the villages and rural parts of the country; and move—"That in the opinion of this House it is desirable to confer upon the local authorities further powers in order to remedy the existing evils."

FRIDAY, FEB. 9.

The Examiners report that, in the cases of the petitions for the Bromsgrove, Droitwich, and Redditch Water, and the Dublin Improvement Acts Amendment Bills, the Standing Orders have not been complied with, were referred to the Select Committee on Standing Orders.

STOREAGE AND CONVEYANCE OF WATER.

Mr. WHALLEY asked the President of the Local Government Board whether it was his intention to introduce a Bill for affording facilities for the storeage and conveyance of water, pursuant to the recommendation of the Commission in their sixth report on the Pollution of Rivers and Domestic Water Supply.

Mr. SCLATER-BOOTH: I presume the recommendation to which the honourable gentleman alludes is "that the owners of land should be permitted to include the cost of village water supply among those expenses which they are now enabled to charge on their estates, with consent of the Improvement Commissioners." Taken by itself, this would hardly be for me to initiate, but, taken in connexion with another well-known recommendation of the Sanitary Commission, it would become of considerable importance. Having regard, however, to the amendments in the law which were effected by the Public Health Act of 1875, I am not prepared at this moment to introduce any Bill having the limited object suggested by the honourable gentleman.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION

SATURDAY, FEB. 10.

(*Before Vice-Chancellor* BACON.)

In re THE NEW GAS GENERATOR COMPANY, LIMITED.

In this case a petition had been presented by Henry Wilson, the administrator of a deceased shareholder, named Vender, the holder of 100 £10 shares, on which £5 had been paid, asking for a compulsory order to wind up the company. The petitioner also claimed to be a creditor of the company.

Mr. HEMMING, Q.C. (with him Mr. OSWALD), said the company were registered on the 16th of May, 1872, and had for their object the production of gas of a very good kind. The capital of the company was to consist of £25,000, divided into 2500 shares of £10 each. No part of the capital was allotted to the public, the seven persons who signed the Memorandum of Association for 750 shares being the only subscribers. The company had never commenced business, the objects for which they were started had failed, and the company had suspended payment. The original office was closed, and no other place had been registered as the office. The petitioner, who was the legal personal representative of Mr. Vender, one of the subscribers, now found himself in the position of being the administrator of a shareholder of 100 shares, upon which he was liable to pay £500, and he wished to be free from the liability, and to know what his position was. When the company were started the arrangement was that if a sufficient number of applications for shares were not received, no allotment would be made, and the deposit money returned. A sufficient number of applications was not received, the deposits were returned, and the only persons who remained were the seven subscribers to the memorandum. The suggestion on the other side would, no doubt, be that because there were so few members the Court would not interfere by way of a compulsory order to wind up, but if a voluntary winding up would be cheaper, the petitioner had not the slightest objection to that course being taken. The petitioner's debt was disputed by the company, who stated that the money was advanced upon the understanding that he should not be repaid. If the company chose at any future time to go on with the business, the petitioner would be liable to pay the £500 remaining uncalled, and from this liability he wished to be freed by a winding-up order. In support of his argument for a compulsory order to wind up, the learned counsel quoted the authority of the *London and County Coal Company* (3rd Equity Cases), *Saunders's Patent Association* (12th Equity), and the *Tuma Cocori Mining Company* (17th Equity).

Mr. KAY, Q.C. (Mr. WHITEHORNE with him), said he appeared on behalf of Frederick and Henry Porter, two of the subscribers to the memorandum, to oppose the petition. He submitted that the present was one of those cases which the Court always regarded with the greatest possible suspicion, because no one knew better than his lordship that such petitions were presented only for the purpose of creating costs. Shortly stated, the facts were as follows:—The company were registered, there being seven subscribers to the memorandum, but the articles provided that no allotment of shares should be made unless 2000 shares at least should be applied for, and a deposit of £2 per share paid thereon. This number of shares was not applied for, and therefore, in pursuance of the articles, no allotment was made, not even to the subscribers to the memorandum, the deposits were returned, and the company never commenced business nor incurred any liability; so that it was a mere name of a company, and had been treated from the beginning as an entirely defunct company. The evidence proved that there was not the shadow of a pretence for saying that Mr. Vender was a creditor of the company, and that he had never in his lifetime made any claim against the company. The cases of *Ex parte Mullins* (3rd De Gex and Smale), the *Natal Company* (1st Hemming and Miller), *Ex parte Wise* (1st Drewery), *The Sea and River Marine Insurance Company* (2nd Equity), clearly proved that an order to wind-up could not be made.

The VICE-CHANCELLOR asked whether the petitioner wished to support the petition in his character of creditor.

Mr. HEMMING said he would rather go upon both points—shareholder and creditor.

Mr. KAY referred to the evidence at some length, in order to prove that the company were never indebted to Mr. Vender.

Mr. WILLIAM BARBER, who appeared for the holder of 100 shares, and for the company, also objected to a winding-up order being made.

The VICE-CHANCELLOR, in delivering judgment, said: The petition was put upon two grounds—first, that the company had not done any business whatever since the year 1873, that they had never commenced business, that the objects for which the company were formed had failed, that the

company had suspended their business for more than a whole year, that the registered office could not be found, and that the company were unable to pay their debts. That was the first ground on which the petition was sought to be supported. The second ground was that the petitioner was a creditor of the company, and the case had been argued on both grounds. The first, which was directed towards the discretion of the Court, was one of general public importance. When the Court was called upon to exercise its equitable authority, it should be satisfied that there was some reasonable ground for its interference, some reason for incurring the costs which were a certain consequence of making the order asked for, and a prospect of some good being done to some one. If the Court were satisfied in these respects, it would make the order asked for. But what necessity existed in the present case? It was undisputed that the company had entirely come to an end, the shares were not allotted, the subscribers who agreed to take shares had had their deposits returned to them, the contracts with the vendors had been given up, no business had been carried on, and no business could by any possibility be carried on; and the petitioner, with an affectation to which he could not listen, and which could not be serious, said that he was under some liability, for that the persons forming the company might hereafter issue shares, and that he, in his character of administrator of Mr. Vender, might be exposed to liability. It was not possible. The company—whether wound up or not did not signify—had entered into a contract to buy patents to carry on gas manufacture; they had rescinded that contract, had no business, no assets, and, moreover, owed no debts, yet it was said that the petitioner came trembling to the Court asking for protection against the danger to which he was exposed. It was impossible to entertain such a case. The authorities might be ransacked, but no case could be found in which the Court had, under circumstances at all approaching the present, made an order to wind-up unless there had been some fraud in the matter which the winding-up might succeed in detecting. In the authorities which had been referred to, fraud was alleged, and the Courts had—to use the words of one of the judges—"extinguished the wretched thing." But, in the present case, the "wretched thing" had extinguished itself, and the order asked for to wind up, if made, could have no other result than to put costs into the solicitors pockets. The other ground on which the order was asked—namely, the alleged debt—was as much extinguished as the first ground. The petitioner found a letter which accompanied a cheque from Mr. Vender, and some entry in a book of Mr. Vender's, and therefore he concluded that he had a claim as creditor against the company. But it was proved by the secretary of the company that Mr. Vender had never paid, on account of the company, a single shilling, that he had never lent any money to the company, that he never claimed to be a creditor, and, further, that the expenses of formation were paid by some other person. There was no ground on which the petitioner could be called a creditor of the company, and that he was aware of that fact his lordship could not entertain the slightest doubt. Being of that opinion, it was his duty to dismiss, with costs, the petition, which had been presented solely for the purpose of creating costs and prolonging a litigation which never ought to have been instituted.

Mr. KAY asked to be allowed to take judgment against the debt, in order to prevent further proceedings on that point.

The VICE-CHANCELLOR said he could not do that; he dismissed the petition because the debt had not been proved.

EDGWARE PETTY SESSIONS.—WEDNESDAY, JAN. 31.

(*Before Serjeant* COX, *Chairman, and Messrs.* FORTNUM *and* HOLMES.)

CONVICTION UNDER THE CONSPIRACY AND PROTECTION OF PROPERTY ACT.

William Page, a stoker, in the employ of the North Middlesex Gas Company, was charged with wilfully and maliciously breaking his contract of service, knowing that the probable consequence would be to deprive the inhabitants of Hendon of light on the 21st ult.

Mr. *William Porteus* said he was secretary and manager of the North Middlesex Gas Company, at Hendon. The defendant had worked for him about two years under a weekly engagement. On Saturday, the 20th ult., when he paid him his wages, he told him he should stop 4s. to ensure his coming to work the following morning. Defendant said: "I shall not submit to that. If you don't pay me in full I shall give you a week's notice." Witness then paid him the 4s., doubting whether he would come, and said, "Now, you understand I shall expect you to come to-morrow." Defendant replied, "If I don't come you know what you can do; you can summon me." It was a very serious matter for the company that the men acted in this way, as they supplied three railway stations and 15 churches with gaslight. Defendant had previously induced two night-men to leave their work, but by persuasion they had the good sense to return to it. Defendant did not come to work on the Sunday or the two following days. In consequence of his not coming on the Sunday witness had to take a lad from the yard and pay him double. He had to employ inferior labour, and calculated that in consequence he made less gas by 20,000 feet.

Defendant said he was not working under agreement, and that he was laid up three days from a pain in his back.

In reply to a question by the CHAIRMAN, Mr. *Porteus* said he did not wish for imprisonment, nor indeed a heavy fine; all he desired was that such an example might be made as would deter the other workmen from acting similarly. He did not wish for any costs.

The BENCH said Mr. Porteus had acted very liberally and kindly to defendant, and this they hoped would prove a warning to him. They also wished it to be known that if any other man was brought before them for a similar offence, he would be sent to prison without the option of a fine.

Defendant was fined £1, and 9s. 6d. costs.

WORSHIP STREET POLICE COURT.—FRIDAY, FEB. 9.

(*Before Mr.* BUSHBY.)

CARRIAGE OF COAL TAR NAPHTHA.

Mr. *T. Wood*, chemist and oil merchant, of 4A, Leather Lane, Holborn, appeared to a summons charged with sending inflammable matter—namely, two casks of coal tar naphtha—by the Great Eastern Railway without marking on the outside of the casks the nature of their contents, and without giving the necessary notice to the railway officials.

Mr. E. MOORE, solicitor to the Great Eastern Railway, said that on the 18th of January last the defendant himself brought to the Great Eastern Railway two casks, which he declared to contain mineral oils. The officials of the company suspecting that they did not contain mineral oils, took samples of the contents, which, on being analyzed, proved to be coal tar naphtha, a highly dangerous substance, giving off an inflammable vapour at less than 20° Fahr. The Act of Parliament empowered railway companies to refuse to carry any substance that gave off an inflammable vapour at less than 150°, and although some other companies would carry it, the Great Eastern had always taken advantage of the Act, and refused to have anything to do with it. The penalty for making the false declaration was £20. The defendant pleaded guilty.

Dr. *Redwood*, analytical chemist, having given evidence as to the inflammable nature of coal tar naphtha,

Mr. BUSHBY said he could see no extenuating circumstances in the case to induce him to mitigate the penalty, the peril to the public was so great. The defendant must therefore pay £20, and £5 7s. costs.

The money was at once paid.

Miscellaneous News.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of Proprietors was held at the Company's Office, Horseferry Road, Westminster, on Friday last—the Hon. RICHARD HOWE BROWNE (the Governor) presiding.

The SECRETARY (Mr. J. Orwell Phillips) read the advertisement convening the meeting, and the minutes of the last general and special meetings, which were approved.

The report of the directors and statement of accounts, which have already been published in the JOURNAL (pp. 155, 197, 198, 199), were taken as read.

The GOVERNOR: Ladies and gentlemen, in moving the adoption of the report and statement of accounts, which you have been good enough to take as read, I might almost confine the few remarks which I intend to make to the first paragraph of that report, which conveys to the proprietors the pleasing information that the company, in every branch of its manufacture and management over which the directors have any control whatever, is improving. I may state, in illustration of that fact, that we have improved in the quantity of gas manufactured per ton of coals to a very large extent during the last half year, as compared with the corresponding period of the year 1875. During the year 1875 the gas made per ton of coal was 9900 cubic feet, whereas in the year now under consideration it was 10,149 cubic feet. This is an amount per ton of coal carbonized which I believe has never been equalled in any London company; and I am sure you will agree with me that it reflects the greatest possible credit upon our engineers, and upon all concerned in the carbonizing department that such a result has been obtained. As to the quantity of gas sold per ton of coal during the last year, the report I have to make to you is still more satisfactory, and I believe it exceeds any figures that have ever been put before the public. The gas sold during the year 1875 was at the rate of 9020 cubic feet per ton of coal carbonized, which in itself was an enormous amount to realize; but in the year 1876 we have been absolutely paid for 9363 feet of gas per ton. This is a most satisfactory state of things, and shows a very rapid improvement in this department of our affairs. The general increase in the consumption of gas during the year has been 6 per cent., or within 5 decimals of 6 per cent. We have never looked for more than about 5 per cent. ordinarily all over our districts. Of course, in some districts the increase has been considerably more, such as in the new districts of Kensington and Highgate, where a large amount of building has been going on. Taking an average over the whole area supplied by the company, it cannot be regarded otherwise than as highly satisfactory that we can report an increase of about 6 per cent. And there is another point to which I may very fairly allude as a matter for congratulation, and that is, that over our enormous area, comprising upwards of 1270 miles of mains, our leakage—or, at least, our "unaccounted-for gas," for it is not all leakage, as we suffer a great deal in other respects through gas being used without being paid for—taking, however, everything into consideration, the leakage on our mains and services only amounts to 6·37 per cent. I very well recollect the day when we used to consider 15 or 16 per cent. a very satisfactory state for our leakage account; and, therefore, the improved state of things now existing shows, I think, the very great attention which has been paid to the supervision of our mains and fittings throughout every portion of our vast district. We adopt a system which we have found to work admirably. We have each street periodically under inspection, so that every main and every service comes under the supervision of the inspectors at certain intervals, say of about three years at the utmost. We adopt the same system also with regard to our meters, and in this way we consider that we have saved enormously in leakage. Turning to other points embraced in the first paragraph in the report, I must refer to one or two matters which are not quite so satisfactory. First of all, I will take the deficiency in the sale of coke. Our great enemy during the last half year has been, of course, the weather. I do not suppose any gentleman present can call to recollection a period in which the autumn and the winter have been so extremely mild as during the last half year. I believe I may say that we have not had a single day's frost, and not a single day's fog—which is a state of things we generally look forward to as a source of additional revenue. We have been unaided by these two allies almost all through the period under consideration. I have been in London every week, and I do not think I have once seen a regular London fog. Again, the wear and tear at Beckton has increased. That station has been at work during the last eight years, and it now requires the usual renewals, replacements, and repairs that every other station of the company requires, and will henceforward find its place in the general wear and tear account. Hitherto there has been very little to do at Beckton; and I must say, in justice to the gentlemen who have had the conduct and control of those works, that they have been constructed and carried on in a manner which has necessitated very little extra expense indeed. The next point I refer to is the announcement made in the report, that we have reduced the price of gas from the 1st of January last to 3s. 6d. per 1000 cubic feet. That was a very bold step to take, many people will say; but I think we were justified in taking it by the state of our finances, and by the future prospects of the company. I assure you the directors went into the nicest possible calculations as to the result of the reduction, and I hope when we next meet you, we shall have to report favourably upon the matter. We must, however, bear in mind that we have had many elements working against us since we made the reduction. We have had coke at an absurdly low price, and a continuance of such weather as has rendered the use of gas almost unnecessary for heating purposes. I have no doubt, notwithstanding, in my own mind, that either this half year or the next the result of the step we have taken will prove most satisfactory to the proprietary. There is another thing which has militated against us, and which every gentleman connected with business has had experience of, and that is the very great dulness and depreciation in trade generally. There is not a tradesman or merchant in the City of London who will not readily testify that, during the whole of last year, owing to "wars and rumours of wars," the trade of the Metropolis was, to a certain extent, paralyzed. There is little or no trade going on in some of the districts of London, which used to be the centres of activity and industry, and we consequently suffer from it. These are circumstances over which, of course, we have no control. In all other matters referred to in the report, which we have been able to influence and control, everything has gone on most satisfactorily. Then, gentlemen, it is stated in the report that we have under consideration the digest of a very large and comprehensive scheme for the connexion of all our stations by large trunk mains. We have not determined, as yet, the exact position of those mains, nor have we gone further than to refer the subject to a committee of our own engineers—most able men, and competent to advise us in

reference to it. We are convinced in our own minds that such a course will tend to economy in the distribution of our gas, and make us independent of any accident which might happen at any one of our stations. The expenditure will necessarily be large, but we believe it will be conducive to the good and safe working of the company generally. We have made several alterations, I may say, since we have joined the Imperial and Independent Companies, in the supervision of our districts, as far as the inspectors are concerned. We have made some radical, and, I believe, most useful and important alterations in the supervision of our districts, changing inspectors from one district to another, and appointing persons to take charge of districts in their own neighbourhood, so as to consult their convenience, and to ensure that every portion of the large area we supply is well looked after. I think that already we have found great advantages accruing from this step, and I trust in future the benefits of it will be found to increase. The next point I will allude to—and I will touch upon it very slightly, because it was dealt with in the last report—is the commutation of the pensions of the officers of the different amalgamated companies. Some of these pensions, however, were not necessitated by the amalgamations, but were pensions for long services rendered. The subject was considered most attentively by the court of directors, and, after the maturest deliberation, we thought the best plan would be to commute those pensions, and thus wipe them off from the books of the company, thereby effecting a saving of about £14,000 or £15,000 a year from the present time. I shall very naturally be asked how we did this, and therefore, to anticipate any discussion upon the subject, I may tell you now (I did not do so at the last meeting, because then the arrangements were not completed) that we applied the unappropriated profits of previous years, which, under our Acts of Parliament, we could not employ otherwise, in commuting these pensions by payments in cash, and so making an investment of the money which, during the next eleven or twelve years, will return us a small amount of interest. Instead of carrying it forward as a balance of profit, for this purpose, as you will see by the accounts, we have taken a part of our surplus fund, which amounted last half year to £134,000, and have supplemented that by about £40,000 from the earnings of the half year under consideration, and have thus wiped off entirely the pensions, which amounted to nearly £15,000 a year. We think that this arrangement, while it has satisfied all the annuitants and pensioners, is the best possible that could have been effected for the shareholders. Then again, since our last meeting, we have carried out and perfected what we foreshadowed in our last report—that is, the formation of a kind of indemnity and insurance fund amongst our own *employés*, from the secretary downwards, as a provision in case of any infidelity or fraud, and to supply the place of those companies which have hitherto done our guarantee business. Without casting the slightest disparagement upon those companies, whom we now no longer employ as our insurers, I may say that we have considered it much better for the officers themselves, and for this company generally, that they should be their own insurers. And, although we have only established the fund since the first of this year, I assure you we have already obtained very satisfactory fruit from it. According to our present system, every gentleman in the service of the company looks after every one very jealously who is appointed to an office. Not that they have any voice in the matter; but if the directors should, through any inadvertence, or from being ill-advised, appoint any person to whom they have any reason to object on account of his former life, habits, and conduct, they would represent to us that he was not a fit person to be associated with them in this general indemnity-fund, and, of course, the directors would take it into consideration, and immediately remove that person from the fund. I hope the proprietors will agree entirely in the step we have taken in this matter. Now, gentlemen, I am always averse to making changes in the form of our accounts; but we have made a little alteration this time which I think you, with me, will approve of. When we took over the undertaking of the Great Central Gas Company, it will be in your recollection that we took over with them, and as a part of their dower, a defalcation-debt of some £70,000. We were obliged, by the scheme of amalgamation then adopted, to pay off that amount by annual instalments. The ingenious gentleman who betrayed the Great Central Company into this heavy loss, was, I believe, Mr. Higgs, and that person's name has appeared in our accounts as a defaulter for the last eight years. I am now happy to say that our accounts have been so far altered that this defalcation appears no longer. We have paid off the whole of the amount, and on the present occasion we have to the credit of our net revenue account, as an asset of the company, a small amount received as a dividend from the estate of Benjamin Higgs. Having referred to the defalcation which we took over from the Great Central, and which was a heavy incubus upon us, I am bound also to say that we have been perfectly satisfied with our bargain. The amalgamation of that company gave us some directors of great practical experience, and amongst them none more so than my excellent friend yonder, Mr. Bennoch. Altogether it proved a most profitable and a most convenient transaction for the Chartered Gas Company. Gentlemen, you will be anxious, very likely, to know something as to our financial position, and the probability of future calls upon our shares. I will, therefore, just state that upon the fourth issue of our capital we have still available £200,000—*i. e.*, we can make two calls to that amount, and in all probability they will be made (though I cannot fix exactly the date) in the course of the present year; one, perhaps, may be needed in July, and the other later on. You may, however, be satisfied on this point, that the directors will not call up a single shilling that is not absolutely requisite for the carrying on of the undertaking. I told you at the last meeting that we were under contract for several very large works at the different stations. We are bound, of course, to carry out those contracts, and they will have to be paid for. They amount, at the present moment, to £321,000. We have ample funds to meet these charges, without trenching upon the fifth issue of capital, upon which we have altogether £400,000 still available, with the addition of £125,000 to be borrowed on debenture stock if we please. We have also, as you know, the capital authorized by the Act of last year, amounting to £1,000,000 in shares, and £1,000,000 in borrowed money, which I hope will not be required for a great many years to come. It may, however, be, and I will not predict that it will not, that the rapid extension of trade in our districts will render it necessary to call up that capital sooner; and if so, all I can say is, that in such a case the sooner the necessity arises the better. Since we last met you here in special meeting, at which you authorized us to raise the sum of £125,000 in debenture stock, we have carried out that operation, and I think I may say on the most favourable terms. I stated at the last meeting our views as to the rate at which that stock should be issued, and some shareholders objected to the low rate of interest we proposed, and said we should not be able to carry out our intentions. I am happy to say that every farthing of the money was subscribed at 4 per cent., and that in addition to the amount we were authorized to raise, we had applications from *bonâ fide* proprietors of the company for eight times the sum we asked, at the same rate. I think no greater evidence can be adduced of the confidence reposed, by those best qualified to understand the matter, in the solidity and future prosperity of this undertaking. I think, moreover, that the gas world is greatly indebted to the company for having placed gas debenture stock on such a footing. I may say that this stock, which we thus raised at 4 per cent., now stands at a considerable premium on the Stock Exchange. Having carried out this operation, we were enabled to renew a very large amount of Imperial debentures—£146,000 at 5 per cent.—which fell due since the 1st of this month, by the same amount of debenture stock issued at 4 per cent., thereby effecting a considerable saving; and, being debenture stock it is a perpetual saving. Debentures are payable at certain times; debenture stock is stock of the company, rating at the interest at which it is issued as long as the company exist. Gentlemen, you are well aware that this company have always adopted the principle of giving to every new invention, and every new material that comes to England, a fair trial, to see what it may be worth for the purpose of our manufacture, and I will now give you an illustration of this. We have been lately trying a new Australian cannel, a most extraordinary mineral, and which, so far as we have examined it, has proved extremely satisfactory. It is a species of shale, and we have found, by putting one of our stations—that at Pimlico—entirely upon this material for a period of one month, that the results are of the most encouraging kind. We believe, from what we see at present, that the importation of it is likely, in future years, to influence considerably the price which is being paid for the cannel used by the company, and which costs such an enormous sum of money. The Boghead and Lesmahagow cannels hitherto at our disposal are extremely costly, and we hope that this new material may prove highly serviceable to us in their place. I am not going to give you any exact results now, for I do not think we are in a position to express any very confident judgment from the short experience we have had as yet. I can only say that, so far as we have at present gone, there is every prospect of a considerable saving being effected by its use. We are very sparing of cannel, because of the great expense it involves, and because, also, of the high illuminating power we are now getting out of common coal; but if the price of this new material should prove moderate, and within our means, there is no doubt that, from the small quantity required, and the small space required for its storeage, it will be a great convenience and advantage to us. It is a stuff which no weather affects at all; it may be left out in the open air quite as well as placed under a covered store, without being deteriorated. I hope that by the next meeting we shall have ascertained the exact cost of freight. We already know what we can procure the material for at Sydney, but we do not yet know what it will cost to bring it over. Now, gentlemen, I dare say you have read a great deal of correspondence lately in the newspapers about officers and *employés* of gas companies receiving commissions from those who supply goods to the companies. I am not at all in the habit of reading anonymous letters of the kind—indeed, I have not the time to do it; and I will say further that I attach very little importance to any letter or document to which the writer is ashamed to affix his name. I treat such things in general as waste paper, and throw them aside. But there has appeared in what is usually called "the leading journal," a letter from a correspondent signing himself "A Commission Abolitionist," to which my attention has been directed. Now, I do not stand here to vindicate the whole of the gas community against the practice which it is alleged is going on; I only stand here to exonerate the officers and *employés* of this company, and I say distinctly that to my knowledge such a practice has never obtained here. I have taken the greatest possible care, and made every inquiry that I possibly could, to ascertain the facts of the case, and I am very pleased to be able to say that I have satisfied myself entirely that the practice has no existence here, and that it has not existed here. And, gentlemen, I will give you the reason why I am satisfied that it could never prevail in this company. I do not know how things are carried on in other companies, as I do not belong to any other gas company in London than the Chartered, but in this company it is next to impossible that any contractor, coalowner, or ironmaster who supplies goods could offer bribes to an officer with any security whatever that it would be the slightest service to him. And I tell you why. Every tender for whatever we require is brought into the court-room open, and initialled by a director, before any one else sees it; therefore, the person who might offer a bribe would have no assurance whatever that influence could be used to get him the contract. On the contrary, in our coal contracts we invariably abide by the results of our experience of various kinds of coal in the preceding year. If we find that a coal is particularly good, we are willing to give a good price for it; if we find it not profitable to the company, we immediately set it aside. This is always done by the vote of the court, and therefore any person attempting to corrupt a servant of the company by bribing would do so at his own risk, and with no certainty that he would obtain a contract at all. I objected to the letter I have referred to when I first read it, because the writer stated that he himself belonged to a firm which had made a very large business by the system of "commissions," and this "Abolitionist" further intimated that he was carrying on the system still, although on a modified scale. This individual, therefore, is evidently himself bribing people to commit robbery, to cheat their masters, for, on his own confession, he is continuing the practice which he condemns. His letter refers principally to the *employés* of gas companies, or I should not have noticed it; and I can only express my wonder and astonishment that such a communication should ever have been allowed to appear in the columns of *The Times*. Gentlemen, presently we shall have to make this meeting special for the consideration of a Bill which the directors have determined to introduce into Parliament this session relative to the purification of gas, and I think that, perhaps a few words from me now, as the matter is alluded to in the report, may save a good deal of time at a future stage of our proceedings. The fact is that last session we were dictated to by the Committee to acquiesce in a provision with reference to the sulphur impurities in gas, which upon experience we find it is impossible to comply with, without creating a nuisance and inconvenience to those who surround us. Latterly, when manufacturing a great deal at Beckton, and other outlying stations, no objection was made to the process we are compelled to adopt; but, as we are under the necessity of using lime at other stations also, so as to bring our purification within the limits prescribed by the Gas Referees, we find that on removing that lime from the purifiers we cause a certain degree of annoyance to our neighbours, whereas if we could get the clause in our Act repealed, which we hope to do this session, we shall be able, by the use of the material we, in common with other companies, have used for many years—the oxide of iron—to purify our gas in a sufficient manner without inflicting a nuisance upon others. Well, now, gentlemen, I shall only add one word in conclusion, and that is with reference to the general policy that has governed this company for the last few years. I think that the high state of prosperity to which this company have now attained, has been attained—and I do not speak egotistically, nor because I desire to praise my brother directors, from whom I have received such great support—but I will say that, in my humble opinion, the status which this company has attained, and which is the highest of any company I know of, is attributable to the liberal, enlightened, and progressive policy which the board, with the consent of the proprietors at large, have followed out for the last 15 years. From the first time that my honourable friend, Mr. Beck, assumed the chair which I now occupy—from that moment a new system was inaugurated in this company. We were not satisfied with the standstill policy of former

years, which suited those who preceded us, and did avail them in those times. Even in my own recollection, I know that the changes, alterations, additions, and improvements which have been effected in the management of the Chartered Gas Company, now so happily combined with the Imperial and Independent, would have frightened our predecessors out of their senses. I recollect the time when there was a contest in this room as to the proposed extension of our gasholders, the ample provision of which is one of the great secrets of the successful working of a gas company, because we ought to have storeage for gas equal to a large per centage, if not the whole, of our make day by day. I am happy to say that, through the influence of my personal friend, Mr. Beck, and others, who were then members of the board of the Chartered Company, we were able to overrule that policy; and now we stand pre-eminent for our large gas storeage, by which means great economy is effected. Then came the question of districting, which was a grand operation, bringing to a close the system of ruinous competition formerly carried on. In past days, five or six mains were laid through a district where one was amply sufficient. That system is happily abolished, and since then we have been at peace with all the world. Then followed the great question of amalgamation, which, in the early years of my friend's governorship, we carried out with five or six of the smaller companies, and which, upon his retirement, we extended by embracing the great Imperial and the Independent Companies. I say, gentlemen, it is these movements and these acts alone to which we are indebted for the high position in which we now stand, and I do trust that whoever may succeed us here will carry out, to the fullest extent, the policy which we have inaugurated, and which, if faithfully persevered in, we believe will secure the lasting prosperity of this vast undertaking. I now beg to move—"That this meeting do agree with and confirm the report of the directors, and the auditors report and statements of the accounts of the company as transmitted."

Mr. E. VAUGHAN RICHARDS, Q.C. (the deputy-governor): After the full and able statement just made by the governor, it will not be necessary for me to do more than briefly second the resolution, which I have very great pleasure in doing. There is only one remark I would make, and that is with regard to the mutual guarantee-fund. It is no new experiment, but one that had been in operation in the Imperial Company for eight years with signal success. It is one of those things that the amalgamated company have borrowed from the Imperial, just as they have borrowed many other things from them and the Independent, which they honestly believed would contribute to the increased prosperity of their undertaking. And I take this opportunity of stating that it has been done with the most perfect straightforwardness, and that we all work together with the most complete harmony in carrying on the work of the company.

After some remarks by Mr. SAYWELL,

The motion was put, and carried unanimously.

The SECRETARY brought up a minute from the court of directors, dated the 26th ult., recommending the dividends mentioned in the report.

On the motion of the GOVERNOR, a resolution in accordance therewith, and declaring the dividends so recommended, was put and carried.

The governor having retired, Mr. Richards took the chair.

Sir A. SCOTT WAUGH said: As an old proprietor of the Chartered Company, and an ancient friend of the Hon. Richard Howe Browne, who is one of the directors retiring by rotation, I have great pleasure in proposing to the meeting that he be re-elected. He has now served the company for 21 years, and during that long and eventful period he has been conspicuous for his zeal, wisdom, and undaunted resolution. The prodigious success of the company is the best criterion of the excellence of its management. Mr. Browne for a long period was the deputy-governor during the reign of our former model governor, Mr. Beck, whom he supported in every part of his administration. Without further eulogy, I move that he be re-elected to a seat at the board.

Mr. BECK: I have very great pleasure in seconding the motion. Having acted with Mr. Browne for many years, I know his qualifications well, and his entire devotion to the interests of the company.

The motion was put, and carried unanimously, and Mr. Browne resumed the presidency of the meeting.

On the motion of Sir A. SCOTT WAUGH, seconded by Mr. PRICE, the other retiring directors—Mr. Hugh Edward Adair, Mr. James Brickwell, Mr. Ulick John Burke, Mr. Robert Temple Frere, Colonel William Thomas Makins, M.P., Mr. Thomas Paine, and Mr. Benjamin Leigh Smith—were also re-elected.

The GOVERNOR: With regard to the election of auditors, I beg to report that Messrs. William Hawes and Mr. R. J. Mansell, the auditors of the late Imperial Company, and Mr. W. T. Reynolds, the auditor of the Independent Company, do not intend to offer themselves for re-election, and I have to bring up the following minute from the court of directors:—"Resolved, that it be recommended to the court of proprietors to vote to the retiring auditors each a gratuity equal to three years of their respective salaries, in pursuance of the 29th section of the Scheme for the Amalgamation of the Imperial and Independent with The Gaslight and Coke Company." I now move that the directors be authorized to pay to each of these gentlemen the gratuity in accordance with such recommendation.

Mr. E. VAUGHAN RICHARDS seconded the motion.

Mr. DOANE asked what the remuneration of these gentlemen had been.

The GOVERNOR: Two of them had £100 a year, and one £50, so that two will receive £300 each, and one £150.

The motion was put and agreed to.

On the motion of Mr. BECK, it was resolved that Mr. J. S. Barker, Mr. T. J. Briggs, and Mr. F. Farnan, be re-elected auditors of the company.

Mr. SAMUEL WARD asked what arrangement was made in reference to the retirement of auditors.

The GOVERNOR said it was arranged between the auditors themselves who should retire and who should remain.

Mr. SAMUEL WARD said he thought the appointment of auditors should be entirely with the shareholders, and it seemed to him by this arrangement the matter was taken out of their hands.

The SECRETARY said up to the present time there had been seven auditors, the representatives of the three companies last amalgamated. Three of them now retired entirely, and of the four remaining, three offered themselves for re-election. This time next year the whole of them would come forward in the same way.

The motion was put and carried.

The meeting was then made Special, for the purpose of considering the Bill about to be introduced by the company, intituled, "A Bill to repeal certain provisions of The Gaslight and Coke Company's Act, 1876, with respect to the purity of the gas supplied by that company."

The SECRETARY read the heads of the Bill, and the sections of the Act of 1876 intended to be repealed.

The GOVERNOR moved, and Mr. RICHARDS seconded, a formal resolution approving of the Bill, subject to such alterations as the directors may deem expedient.

A SHAREHOLDER asked whether the Bill was likely to be opposed.

The GOVERNOR said he thought most likely it would be by the local authorities.

The motion was put and carried.

A cordial vote of thanks was given to the Governor, Deputy-Governor, and Directors, for their able management of the affairs of the company.

The GOVERNOR acknowledged the vote.

A vote of thanks was also given to the Secretary and staff for their services.

The SECRETARY acknowledged the compliment, and the proceedings terminated.

STOCKTON AND MIDDLESBROUGH WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held at Darlington on the 6th inst.—Mr. H. PEASE in the chair.

The SECRETARY having read the notice convening the meeting,

The CHAIRMAN said the directors had not circulated any full statement in the usual form among the members, but they had laid on the table the report of the directors, which every shareholder was fully at liberty to inspect. Nothing devolved upon him at the present moment further than to say that, notwithstanding the general depression of trade in the district the company had been supplying with water for so many years, their property was still a developing property, and was still in a healthy and satisfactory state. The board were not contemplating any large new works, neither did the past history of the company require referring to, because they were very well aware of it.

Two or three SHAREHOLDERS expressed an opinion that the report ought to be read, but

The CHAIRMAN said it was always agreeable to the directors to meet the views of the proprietary; but they were in the position of trustees, and were endeavouring to execute that trust to the very best of their judgment. The directors informed them that the affairs were thoroughly sound and healthy, and the whole of the proceedings was laid before them, in which the figures were as fully published as in the newspaper. The directors were acting for the very best interests of the concern, and they asked the shareholders to read the figures for themselves, and make themselves satisfied.

Mr. HOBSON thought that, under the peculiar circumstances in which the company were placed at the present time, it would be better to accept the statement of the directors.

Mr. J. H. BOWMAN, a director, said there were very few gentlemen there who knew what treatment the directors had received. In dealing with the parties who wished to buy the works, papers which had been considered private and confidential were brought up by counsel and witnesses when before the parliamentary committee. In adopting the course which they did on the present occasion, the directors did so with the desire to prevent anything from being brought against them in the arbitration which was imminent. A very great amount of money was at stake in the arbitration they were looking forward to, and the interests of the shareholders would be best consulted by keeping their own counsel, and getting as much information as they possibly could.

Mr. GRACE said that, in the arbitration referred to, the figures would have to go before the arbitrators, or the enemies of the company, if they liked to call them that, and this being so, why not let the shareholders know now?

Mr. BOWMAN said they could know all they wished by looking for themselves.

The CHAIRMAN then moved the following resolution:—"That a dividend be declared on the original and 'A' shares at the rate of 12s. 6d. per share, and on the 'B' and 'D' shares 10s. per share, payable at the National Provincial Bank of England, Darlington, on Wednesday, Feb. 7, 1877."

Mr. A. KITCHING seconded the resolution.

Mr. GRACE said the declaration of dividend rested with the directors and not with the shareholders.

Mr. THOMPSON said the directors had declared the dividend, and the shareholders were now asked to confirm it.

The resolution was then carried.

On the motion of Mr. FOGGITT, seconded by Mr. KAY, Messrs. Henry Pease and W. Thompson were re-elected directors; and Mr. W. F. Laidler was subsequently re-elected auditor.

Mr. GRACE said, with reference to the statements he made at the last meeting, about the balance remaining in the hands of the directors after the payment of dividend, this balance should have been shown on the balance-sheet, or, if expended, the expenditure should have been shown. He tried to convey that view to the meeting, but it had been since represented to him that by alluding to that balance he had let the Corporations of Stockton and Middlesbrough know there was a balance. He would, however, remind them that whereas he named the matter in August, so long ago as March in the House of Commons, and June in the House of Lords, Mr. Bowman gave those very figures, and showed that, after paying their back dividends, they had a balance over, so that he could not have been culpable in letting the corporations know. One jocose gentleman told him that he had "let the cat out of the bag," and what he wished them to know was that when he referred to the matter, the corporations were already informed of it.

The CHAIRMAN said that no doubt Mr. Grace had endeavoured to exercise his right position as a shareholder, whatever might come of it.

A vote of thanks having been proposed to the chairman and directors,

Mr. MOSSOM, in seconding, said that, considering the peculiar circumstances in which the company were placed, the shareholders were quite right in acting on their advice.

The vote having been passed, the CHAIRMAN, in reply, said the position of the directors was no bed of roses.

The meeting then terminated.

GAS EXPLOSION AT CORK.—On the 25th ult., we learn from a correspondent that a serious explosion of gas took place at the house of Mr. Samuel Hill, builder, Sunmount Terrace, near the Military Road. Happily, however, there was no loss of life, a fact which was due to the extraordinary presence of mind Mr. Hill showed in turning off the gas at the meter, he at the time having been burnt on the face and arms. The cause of the explosion, as far as can be gleaned was due to negligence in not properly turning the gas off, so as to allow an escape, also to a leakage in the jointing of the pipes between the rafters. After the lights were supposed to be turned off, the inmates retired to rest, and in the course of the night Mr. Hill perceived a smell of gas, which pervaded his bedroom. He got up and went downstairs for the purpose of stopping the leakage; but he incautiously lit a match before he succeeded in finding the meter. Instantly a fearful explosion occurred, shattering everything in the house to pieces. Although the house is a comparatively new one, in a moment it was a complete wreck, the ceiling being entirely blown off the kitchen, the windows shattered, the plaster fell from the walls, and the pictures and various articles were broken—the entire house presenting a scene of confusion. Mr. Hill had a most extraordinary escape, as he with the most wonderful presence of mind, and in the middle of the flames and *débris*, burned as he was, ran to the meter, turned off the gas, thus saving the house from fire. The other inmates of the house escaped unhurt, and Mr. Hill was subsequently attended by Dr. H. M'Naughton Jones, who pronounced his injuries not to be of a serious character.

GAS AFFAIRS AT BISHOP AUCKLAND.

A Meeting of the Ratepayers of Bishop Auckland was held on the 6th inst., to take into consideration the propriety of opposing the Bill about to be brought before Parliament by the Bishop Auckland Gas Company. The chair was occupied by Mr. R. Bowser, the Chairman of the Local Board, and there was a large attendance.

The Chairman, in opening the proceedings, said that after the gas company had agreed to entertain a proposition for the sale of their works, and the local board had applied to the Local Government Board for a Provisional Order to purchase, much to their surprise an advertisement appeared in the newspapers, giving notice of the intention of the gas company themselves to apply to Parliament for an Act of Incorporation. The company were an ordinary trading joint-stock company, possessing no rights or powers, and if they obtained the Act of Parliament which they sought they would then possess complete control over the gas supply, whether the local board liked it or not. Not only had the company sought to obtain these powers, but they gave the local board a backhand blow by raising all the opposition they could to the Provisional Order. The powers which the company sought to obtain, if obtained, would give the company a control over the gas supply which would be most prejudicial to the interests of the ratepayers, and, therefore, the local board took steps to oppose the Bill. Before doing so, however, they satisfied themselves that such a course would be to the interests of the ratepayers. The board considered that there was no town in the county of Durham or in England so well situated as Bishop Auckland for the supply of the raw material for making gas. They had received a number of communications from other places with regard to the price of gas, and from them they found that in Bingley the local board made a profit of £1534, which amount went to the diminution of the rates. At Bury, in Lancashire, a profit of £8953 was made; and at Rotherham, a town very similarly situated to Bishop Auckland, the price paid by consumers being 3s. and 3s. 3d. per 1000 feet, they made a profit of £4000. Coals passed through Bishop Auckland to Darlington; but still the corporation there supplied gas at 3s. per 1000 feet. It might be said that they were not able to manage the manufacture of gas; but he saw gentlemen around him who were as competent to manage such a concern as any in the kingdom. As an instance of their competency, he would refer to their management of the water-works. Out of the water-rates—and they were only some 2d. in the pound—they had made a profit of £324 7s. 8d., and if they charged the Waskerley water-rate, they would have made a profit of £1528. The question for the ratepayers was, Would they support the local board in obtaining cheaper gas, or would they support the gas company in making their monopoly perpetual? He concluded by moving that the sanction of the ratepayers be given to the opposition against the company's Bill.

Mr. J. Proud (Chairman of the Gas Committee of the Board of Health) seconded the motion, and said that some ten or twelve years ago he advised the gas company to supply gas to Bishop Auckland at as cheap a rate as gas was supplied to any town in England, and it was because they had not accepted that advice that he opposed them now. The gas company possessed a capital of £8376, and, finding that that was too small a capital on the strength of which to ask Parliament to hand over the ratepayers to the control of a few capitalists, and that such a request would be treated as ridiculous, they said they would supply Heighington, and Shildon, and Evenwood, and St. Helen's with gas, and they proposed to increase their capital to £80,000 Was it because St. Helen's or West Auckland wanted gas that the company wished to have the privilege of supplying them? No, for they had gas already. Shildon could have its own, and if Evenwood wanted gas it would not come to Bishop Auckland, but go to St. Helen's. To show further that the company were insincere and unreal in asking this increase of capital, there was not one word in the Bill about the time when Heighington and Shildon should be supplied, and when the company got their Bill they could, and no doubt would, put their hands in their pockets and say, "We'll rest and be thankful." Again, it was not to the interest of the ratepayers of Bishop Auckland that the company should supply Heighington and Shildon, for it would rob them of the benefits they had worked for and deserved. That was the first objection. If they grumbled at the price of gas supplied by a company with a capital of £8000, how could they expect to obtain it cheaper from a company with a capital of £80,000? That was the second objection to the Bill; and the third was that they asked a greater rate of interest than they ought to get. The fourth objection was that the company sought the right to break up the streets and channels of the town, whether the board were willing or not, without the slightest consideration. The fifth objection was that the company, in clause 55 of the Bill, said they "may from time to time supply" gas if they thought fit. Now they ought to have this "may" turned into "shall." The sixth objection was that the maximum price of 5s. per 1000 feet was too high, for though they might be restricted to a certain dividend, if they had a balance after that, and he believed they would, they would not reduce the price of the gas, but say that they believed in paying their directors and secretary handsomely. In conclusion, he said that although the company had been supplying the town with gas for 30 years, they never thought of going to Parliament till the action of the ratepayers drove them.

The motion was put and carried almost unanimously, but

Mr. R. Welburn demanded a poll, which the chairman announced would take place.

Another resolution was then moved, expressive of the confidence the ratepayers felt in the local board, after which the proceedings were brought to a close by a hearty vote of thanks to Mr. Bowser for presiding.

Manchester District Association of Gas Engineers.—A paragraph appeared in our last number briefly recording a meeting of this Association on the 1st inst. The notice was condensed from a report in a Stafford newspaper, forwarded to us by post, and specially marked by the sender to call our attention to it. We are, however, called upon by authority to deny the truthfulness of the paragraph, and to say that no such meeting was held as stated.

Skelmanthorpe Gas Company, Limited.—The eighteenth general meeting was held, at the works, on the 1st inst.—Mr. J. Kaye presiding. The report, which was read by Mr. J. Booth, the secretary and manager, showed that the company are in a flourishing condition. The usual dividend of 5 per cent. was declared payable at once, 5 per cent. was allowed for depreciation, and a handsome surplus was placed to the reserve-fund. The retiring directors were re-elected, along with Mr. Henry Wadsworth, in place of Mr. Henry Dalton, deceased.

Ilkeston Gas Supply.—At the meeting of the Ilkeston Local Board, on the 6th inst., it was proposed that a properly-qualified person should be employed to examine the works of the company, the supply of gas, and enter into the whole matter, so that the Board might be thoroughly prepared with evidence to oppose the application of the company for a Provisional Order, and also to meet any representations of the company in the event of a commissioner being sent down by the Government to make a preliminary inquiry into the matter. A lengthy discussion ensued, but it was ultimately agreed to leave the whole matter in the hands of the committee appointed as a Gas Committee at the last meeting.

NEW GASHOLDER AT THE NORWICH GAS-WORKS.

A telescope gasholder and wrought-iron tank, possessing some novel features of construction, have recently been erected, and put into operation by the Messrs. C. and W. Walker, of Donnington, at the Norwich Gas-Works.

The gasholder, in two lifts, is of the height of its own diameter, which is 70 feet, the upper and lower lifts being 35 feet deep each. The tank is 35 feet deep. As the soil upon which the tank rests is of unequal character, the tank bottom was made of wrought-iron plates, in order to be capable of sinking a little without fracture, in case of any uneven settlement in the soil beneath. Surrounding circumstances also rendered it necessary that the tank should not only be abundantly strong, to resist the pressure of water 35 feet deep from the interior, but that it should also be strongly framed, to resist any uneven thrust from the exterior—of a nature to cause distortion or collapse—in the event of its being necessary at any time to empty the tank. To provide for this, the tank on the exterior was strongly framed by rings of channel iron, connected by vertical girders, in such a manner that a thrust or pressure received at any point would be immediately resisted by the entire framing; the strain being, by the construction, received and distributed over the entire area of the framings strongly connected to the sides of the tank.

The inlet and outlet pipes, 2 feet diameter, are of wrought iron, entering and leaving in the usual manner, and the gasholder crown is fitted with Livesey's patent man-lid for enabling the interior of the pipes to be got at without emptying the gas from the crown. In the course of its erection, the tank bottom, resting on blocks with its first tier of side-plates, was first rivetted up, and then proved with water. After which, the entire bottom and one tier of the sides was lifted in one piece, and lowered on to its foundation.

For the before-mentioned reasons, also, it became necessary to construct the columns of wrought iron instead of cast iron. The columns, seven in number, were, therefore, made 2 feet 6 inches diameter, of wrought-iron plates, and in their construction, the planing-machine and the lathe were brought largely into use, and their strength and rigidity much increased thereby. The plates were planed on their edges, and curved by long rolls, the seam being invisible, when the edges were brought together, iron to iron. Each length of the column shaft thus formed was placed in the lathe and carefully turned on the ends. No rivets are visible, and when the columns are erected on the site—their outer surfaces cylindrical and smooth all over from bottom to top, without the sign of a hammer mark—they more than equal in appearance the fairest castings; in fact, no practical man could tell whether the columns were of wrought or cast iron, judging from their external appearance.

The columns were found to possess great strength, and capable of resisting the highest winds. The gasholder being in an exposed position, a middle tier of wrought-iron girders connects the columns in the middle of their height, and they are further tied together at the top with a strong tier of wrought-iron trellis girders. The girder framing was subjected to several severe strains, and was found to be firm, rigid, and unyielding.

The whole of the work had been so carefully made, and erected with all rivet-holes fair and true, that, on the completion of the whole work, the tank standing its whole height, 35 feet above its foundation, out of the ground, without any exterior support, was filled with water, and found to be perfectly water-tight. As soon as the water had reached the brim, gas was admitted into the holder, which was put into service without any air testing, and was found gas-tight, rising and descending freely and truly from top to bottom.

Faversham Water Company.—The annual meeting was held on the 5th inst.—the Mayor presiding. The profits on the past year's working amounted to £645 odd, out of which it was agreed to declare a general dividend of 7 per cent., without deduction for income-tax, and to add £35 to the reserve-fund.

Carnarvon Corporation Gas-Works.—At the meeting of the Carnarvon Town Council, on the 6th inst., a report was brought up from the Gas Committee, which stated that during the three months ended Dec. 31, 1876, the consumption of gas was 417,610 cubic feet in excess of the four months ended the same period of 1875, while the leakage account had been reduced from 19 to 8½ per cent. They recommended that the contract with Mr. William Jones for the repair of the meters should be discontinued, and the manager directed to obtain the services of a competent gas-fitter to be employed under his directions. The balance-sheet for the 16 months from Aug. 25, 1875, when the works came into the hands of the council, to Dec. 31, 1876, showed a balance of profit of £676 17s. 1d., the expenditure being £3933 12s. 8d., and the receipts £4610 9s. 9d. The new exhauster was working admirably, and had greatly improved the quality of the gas. Mr. De Winton explained that for some years the whole of the profits on the works would be swallowed up in extensions; but, at the same time, the debt would be gradually extinguished and the works would be greatly increased in value. An offer had been made by Mr. Dawes on behalf of Mr. Assheton-Smith for the purchase by the corporation of the Nantlle railway embankment, which was necessary for the extension of the works. A sum of £125, or 6d. per yard for 5000 yards, was asked, and the committee, thinking such an excellent opportunity should not be allowed to pass, had made the purchase, subject to the approval of the council. The report was adopted.

The Surrey Bourne Water.—On the 5th inst. hundreds of persons proceeded from Croydon in the direction of Caterham, in consequence of its being generally rumoured that the Bourne Water had begun to flow from the Surrey hills. The rumour proved to be perfectly correct. The water had overflown the great natural reservoirs of the chalk strata, and was seen pouring in a perfect torrent towards Croydon. In many parts where the channel provided for its course is inadequate, the water has escaped into low-lying fields, which it has converted into perfect lakes. These broad sheets of water, as they mirrored the glowing sunlight, gleamed like belts of silver at the base of the Surrey hills, imparting an unusual charm to the landscape. Before Croydon was converted to the cause of sanitary reform, an overflow of the Bourne was looked upon as a calamity to the district. The "woe water," as it was called, flooded most of the houses of the old town, and after it subsided much sickness and disease usually followed. These evils have been remedied by two important works carried out by the Croydon Board of Health. In the first place, the board purchased and removed a water-mill which stood near the parish church, and which dammed the water back upon the Old Town about 11 feet. In the next place, the board constructed the Bourne culvert, which, at a depth of several feet, extends in the bed of porous gravel from the outlet of the Bourne at the river Wandle, under the Old Town, to a long distance down the Brighton road. The culvert is between 3 feet and 4 feet in diameter, and for the sake of drawing the water from the ground it is constructed chiefly of bricks without cement, so that it now not only receives the stream of the Bourne before it arrives near to the town, but effectually keeps down the water in the gravel beds, which, before these works were accomplished, were always satuated to within a few inches of the surface. The Bourne is now running at a very rapid rate, and a daily increase in the volume of water may be looked for.—*The Times.*

SOUTHAMPTON GAS COMPANY.

[From a series of papers on "The Industries of Southampton," in the *Hampshire Independent*.]

No sketch of the operations of the Southampton Gas Company would be complete without reference to the part taken by this town in the early history of gas lighting. Although gas had been used for the purposes of artificial lighting, in various manufactories in England, before the beginning of the present century, it was not till 1810 that sufficient success attended the promoters of this method of illumination to warrant their applying for an Act incorporating a gaslight company; and powers, it is recorded, were granted for that purpose two years later, in order to make a great experiment of a plan of such extraordinary novelty. These powers had been obtained only seven years when, in 1819, gas-works were erected in Southampton, at a cost of from £20,000 to £30,000, by two brothers named Barlow, who soon afterwards entered into a contract with the Board of Improvement Commissioners (answering to our present Urban Sanitary Authority) for lighting the public lamps of the town, then numbering only about 150, within half an hour after sunset, and continuing them burning till within an hour of sunrise, at 10s. (ten shillings!) per lamp per year, the price charged to private consumers, for the first 20 years of the existence of the undertaking, being 15s. per 1000 cubic feet; a charge which was reduced in 1839 to 11s. prepayment and 12s. credit. In the year 1823 the works were sold to a company, by whom, four years later, they were leased to Mr. Samuel Dunn, and afterwards to his brother. Both failing to make the undertaking a financial success, the company, in 1839, resumed possession of the works. The 10s. contract with the Improvement Commissioners expiring in 1841, negotiations were opened for a renewal, which ended in the price being advanced to £4 10s. per lamp per year for 21 years, with 6s. for lighting, extinguishing, and repairs. Four years later, the Paving Commissioners desiring to extend the lighting to the district over which they had jurisdiction, a new contract was made with them at £4 per lamp, to include all charges. In 1844, the price to private consumers was reduced from 11s. to 9s., or for credit from 12s. to 10s.; in 1846, from 9s. to 8s.; and again from 8s. to 6s., just previous to an application to Parliament for incorporating a second company in the town, under the title of the "Southampton Consumers Gaslight and Coke Company." In respect to this application a local inquiry was held, under the authority of the House of Commons, by a barrister and a civil engineer. They sat in the town-hall some days, and having heard the evidence of a number of inhabitants, many of whom are still living—Alderman Tucker, Mr. J. H. Cooksey, Mr. J. R. Weston, Mr. Phippard, Mr. Joseph Hill, Mr. Taylor Dore, Mr. Fisk, Mr. J. S. Bartlett, Mr. Barling, and others—they reported against the promoters, but said they were "fully conscious that the formation of the company had been of service to Southampton, in rendering the present company more anxious to meet the wishes of the consumers, more particularly as respects the diminution in price." In 1865 another attempt was made to found an independent company, but it failed, the present company making certain concessions and obtaining increased powers, as they did again in 1876, an effort, it will be remembered, having just previously been made on the part of the corporation to purchase the works.

One of the results of the inquiry in 1847 was the appointment, as manager of the works, of Mr. James Sharp, who held that position and proved himself an eminently useful townsman, until 1867, when he retired, and was succeeded by Mr. S. W. Durkin, who had for some years assisted him in the management, and has ever since had sole charge of the works, At the time of Mr. Sharp's retirement, the establishment was undergoing reconstruction from plans by Mr. J. B. Paddon, C.E., of Brighton, and we have had the testimony of competent persons, living at a distance, that the works are now amongst the most perfect and economical in the kingdom. The coals are brought by sea and landed on the company's own wharf, on the banks of the Itchen, close alongside the works. The first process for extracting the gas from these coals is to submit them to a high heat, by placing them in retorts, which are arranged in groups, each group being heated by a suitable furnace, supplied with coke produced during the process of manufacture. The total number of retorts is at present 260, the number in actual use varying according to the demand made on the works, but averaging at this time of the year about 175 daily. The process of gas-making being continuous, these retorts are worked by day and night, three gangs of men being employed in this department, each under a working foreman, who relieve each other every eight hours. To see a retort emptied of the coke to which the coal is reduced, and charged with a fresh supply, forms to a southerner a sight second only in interest to the working of an iron foundry. The coal being placed in a semi-cylindrical scoop, is suddenly lifted into the incandescent retort by three men, who have need both to be trained to this hard work and to be expert, for a lazy or inefficient man may allow a considerable quantity of flame, which contains all the essentials of gas, to escape. The proper charge being completed, frequently in less time than it takes to write a description of the process, the retort is hermetically closed. The products instantaneously find their way up a pipe fixed on the front of the retort into what is known as the hydraulic main—a large iron tube extending the whole length of the group of retorts. This being partially filled with ammoniacal water and tar, produced during the manufacture, the gas, as it is generated, forces itself through this liquid, and, being unable to return, escapes by the only available passage to the apparatus for purifying the gas, which is assisted in its course by the exhaustion produced by a rotary pump driven by steam-power, suitable boilers and engines in duplicate being provided for this purpose. Originally gas was used in the state in which it passed from the hydraulic main, but, to cleanse it of impurities, it is now conveyed into a condenser, or series of pipes, where its temperature is reduced, and the products of condensation, tar, and ammoniacal liquor, are received into vessels prepared for the purpose. To separate the tar still held in suspension, and the ammonia which exists as gas, it is then passed into the washer or scrubber—a large vertical cylinder known among the workmen as the "Tower of Babel," wherein the gas, by a series of boards placed edgewise, is broken up into innumerable ascending streams, meeting in its upward course a continuous shower of the ammoniacal liquor before referred to, this washing process being eventually finished with clean water. Passing out of the scrubber, it enters the purifiers, a series of iron chests, charged with oxide of iron and lime, which absorb the carbonic acid and sulphuretted hydrogen contained in the gas, this being the last process through which it passes before being conveyed to the station-meter and thence to the gasholders. The station-meter is much like an ordinary house meter, only, of course, much larger, and required to register millions of feet instead of thousands. Every hour of the day and night the foreman registers the make and consumption of gas, and draws up a debtor and creditor account, showing at sight the stock which the company possess, and which is accordingly either increased or decreased as experience and circumstances require. The gas is now in a chamber connected with the gas holders, of which there are four in the company's yard, the largest holding half a million cubic feet of gas. Attached to a second chamber is an apparatus called the governor, which regulates the pressure as it passes to the arterial mains and lateral pipes supplying the company's district, and embracing eighty miles of pipe, from two inches to sixteen inches in diameter, the last mentioned being the size in which the gas is delivered from the works.

The company's responsibility, however, does not end here; for, supposing the gas to have escaped deterioration by the retorts being a little too hot or a little too cold, if the gas happens to have been excessively condensed, a troublesome deposit, called naphthaline, settles in the mains and services, especially in the winter time, even if there are no troubles arising out of the vapour of water which gas carries in its passage from the tanks of the gasholders—to collect which vapour, as it condenses, is the object of the syphons one sees placed at intervals along the lines of gas-mains. The company being under parliamentary obligation to supply gas of a stated quality, several times a day the gas is tested, as it passes off their premises, by a photometer, placed in a perfectly dark room. This is an instrument of great beauty and simplicity. An Argand burner at one end, consuming 5 feet of gas per hour, is compared with sperm candles at the other end, so adjusted as to burn 120 grains per hour. The total of the several readings is taken, and as gas is materially affected by the temperature and barometric pressure to which it is subjected, stated adjustments are made to meet these ends, and the precise illuminating quality of the gas is thus determined. The gas having passed from the works, there remains, as the present writer has found by experience, a duty on the part of the consumer to see that the illuminating power of the article with which he is supplied is not deteriorated by improper fittings, and especially by defective burners, than which latter nothing is more common, and, perhaps, nothing less frequently suspected. Gas lighting has of late years become such a purely scientific subject that many burners have been brought out, notably those by Leoni, Brönner, and Bray. For a steady and remarkably pure light, we have found Sugg's "London" flat-flame burner, with self-acting governor, exceptionally pleasant and effective; and, profiting by our own experience, we strongly recommend all who have cause to complain of their gas to ascertain, as a first step, that the fault is not their own, by reason of defective burners. A few shillings or even pence spent this way will be found an experiment well worth making.

It remains only to say that the consumption of coal yearly at our gas-works is from 16,000 to 17,000 tons; that the amount paid in weekly wages to men, and exclusive of the salaries of the *employés* in the more responsible positions, varies from about £200 per week in the busy season to little more than half that amount in the summer; and, as bearing upon a recent controversy in the town, that statistics published by Mr. Field, of London, show that consumers in the metropolitan districts contribute 1·05d. to the local rates on every 1000 cubic feet of gas sold, as against 4·215d. per 1000 feet on the gas sold within the town of Southampton.

Sevenoaks Water Supply.—At the last meeting of the local board it was decided that it was desirable that the board should obtain by purchase the works of the present Sevenoaks Water-Works Company, and the clerk was instructed to communicate with the company to know upon what terms they would be willing to sell their works to the local board.

Effects of Heated Air on Book Bindings.—At a conference of librarians held in Philadelphia, U.S.A., in the autumn of last year, a variety of subjects connected with the successful management of libraries were discussed, among others may be noted that of binding. All present seemed to agree that leather bindings were extremely perishable, but nothing better was suggested. The various experience elicited proves that the real cause of destruction is heated air, drying up the oil in the binding; such air, of course, rises, and so, even in a library like that of the Boston Athenæum, not lighted at all, the books in a gallery fall to pieces much sooner than those on the lower floor. One of the largest libraries in London, that of the London Institution, has conquered this difficulty by binding all its books in half buckram; the buckram can be obtained in at least four colours (a leather lettering-piece may or may not be put on), and is so very strong, neat, and cheap, that the rare use of it must be due to equally rare acquaintance with the material. Much may also be done to preserve leather bindings by lighting libraries with sunlights, which, properly constructed, are perfect ventilators.

Walsall Corporation Gas-Works.—At the meeting of the Walsall Town Council on the 5th inst., two resolutions of the Gas Committee, the one directing a contract to be entered into with Messrs. Horsman and Co., for the construction of a gasholder-tank on the site of the new gas-works at the Pleck, for the sum of £5058, in accordance with plans, sections, and specification prepared by the gas engineer; and the other directing a contract to be entered into with Mr. Daniel Howard, for the construction and erection of a gasholder, 120 feet in diameter, for the sum of £4435, were confirmed. The Gas Committee were also authorized to enter into contracts for the erection of a retort-house and stack, and for the construction of a canal basin and railway sidings, at the new gas-works, and to take all necessary steps and proceedings in relation thereto, and to enter into all bargains and other matters connected with, or incident to, the erection of the new works. The common seal of the borough having been ordered to be affixed to a notice to the Birmingham Corporation that the council will take, over from the 1st of July next, the gas undertaking late of the Birmingham and Staffordshire Gaslight Company, the town-clerk was authorized to raise on mortgage, pursuant to a recommendation of the General Purposes Committee, a further sum of £8000 at 4 per cent., towards the cost of the new gas-works, and to direct the common seal to be affixed to a mortgage debenture for such sum.

Compensation to the Officers of the late Leeds Gaslight Company.—At a meeting of the Leeds Town Council on Wednesday last, the following memorial, signed by four officials of the late Leeds Gas Company, was presented:—

To the Worshipful the Mayor, Aldermen, and Burgesses of the Borough of Leeds.

Gentlemen,—An Act of Parliament was passed in the 33rd and 34th Vict., cap. 56, and called "The Leeds Corporation Gas Act, 1870," wherein by clause 5 it is provided that on payment of the purchase-money each company shall be at liberty to retain out of their general assets or contingent-fund the sum of £2500 for the purpose of providing compensation at the discretion of their respective directors for any officers or others in their employment or service. This amount (£2500) was retained by the directors on Sept. 1, 1870. On Feb. 1, 1871, £1560 was distributed by the directors among their late officials. In 1873 a deputation from the officials waited upon the directors to ask that the balance might be divided, but met with no success. In 1875 the following memorial was presented to the directors, but received no attention:—"Sir,—We, the undersigned, respectfully beg to bring under your notice the balance which remains unappropriated of the £2500 retained by the company for the purpose of providing compensation at the discretion of the directors for any officer or others in their employment or service. More than three years have elapsed since a partial distribution of £1560 was made, and we hope that you will not think us presumptuous in asking respectfully that the balance may be equitably divided in accordance with the 5th clause of the Leeds Corporation Gas Act, 1870." And now, after nearly seven years have expired, the balance, supposed to be about £1000, still remains undivided. We, the undersigned, formerly officials in the Leeds Gaslight Company, earnestly hope that the corporation will be pleased to take such steps as may be necessary to carry out the intention of the council and the Legislature.

The town-clerk said he had referred the memorialists to two of the directors of the old gas company (Mr. Oxley and Mr. Wray), and Mr. Oxley had expressed his anxiety to distribute it. Mr. Wray said that the directors were distributing part of the money now. On the motion of Alderman Tatham the memorial was referred to the Gas Committee, with instructions to report.

GAS AFFAIRS IN AMERICA.

REPORT OF THE GAS COMMISSIONERS IN RELATION TO THE SUPPLY OF GAS TO THE CITY OF BOSTON.

In January, 1875, the Board of Aldermen of the City of Boston passed an Order, requesting His Honour the Mayor to appoint three Commissioners to investigate and report—

1. Upon the quality and price of the gas furnished in the city, as compared with other large cities in America and Europe.
2. Whether any improvements can be made in the present methods of manufacturing gas by the different companies in the city.
3. Whether it would be expedient for the city to undertake the manufacture and supply of gas for public and private lighting.
4. Whether any further legislation is desirable to enable gas consumers or the municipal authorities to secure a prompt and impartial investigation of complaints against private companies, and an efficient remedy for any abuses of which they may be found guilty.

The commissioners appointed under this order were Messrs. Charles F. Choate, John Felt Osgood, and Edward S. Wood, and they presented their report in the month of October last. It was as follows:—

REPORT.

In order to enable ourselves to arrive at definite conclusions upon the subjects included in the above order, we have studied and shall consider in the following pages—

1. The various processes for manufacturing gas in use in this and other cities, comparing one process with the other in regard to the quality of the gas made, and so far as possible in regard to the cost of its manufacture. 2. The peculiar relations which exist between municipalities and the gas corporation or corporations located in them. 3. The state and city laws which govern or have a bearing upon the gas corporations in this city.

And for the sake of convenience this report will be divided into the following parts:—

1. General considerations.
2. Processes used in the manufacture of illuminating gas.
3. Comparison of principal gas companies and works.
4. Relations of municipalities to gas corporations.
5. Competition.
6. Conclusions.

General Considerations.

It will be remembered that the passage of the above order was the result of hearings before the Board of Aldermen on Nov. 9, 16, 30, and Dec. 7, 1874, on the petition of a company, calling itself the "Citizens Gaslight Company," for permission to lay pipes in the streets of Boston, and compete with the Boston Gaslight Company in the sale of gas to the citizens.* It was claimed by the petitioners that gas of a better quality than that now supplied could be furnished at the price of 2 dols. per 1000 cubic feet—50 cents less than that charged at that time by the Boston Gaslight Company—and that this price would be sufficient to guarantee a fair dividend to the stockholders. On the other hand, the opponents of the scheme, especially the Boston Gaslight Company, argued that coal gas could not be supplied for 2 dols. per 1000 cubic feet with a fair profit; that on no account should competition be allowed, on account of the injury done to the streets, and for the reason that competition, where the demand for the product supplied is limited, as in the case of gas, does not ensure a cheaper rate, since some arrangement is inevitably made between the competing companies, which finally results in raising instead of lowering the price—the people being obliged to pay the profit on two capitals instead of one.

It will also be remembered that at this hearing it was extremely difficult to obtain the exact cost of the manufacture of gas with all the items which go to make up that cost. Unfortunately the commissioners have met with the same difficulty, and where they have been successful in gaining the desired information, it has been given "confidentially." They are, therefore, unable to make it public in this report, although they themselves have been able to form accurate comparisons.

Sources of Information.—In order to be able to compare accurately the gas supplied to the citizens of the places mentioned in the following pages, we have availed ourselves of various sources of information.

1. Personal inspection. We have visited the gas-works in New York, Brooklyn, Philadelphia, Chicago, Detroit, Saratoga, Poughkeepsie, Boston and vicinity, Lowell, Lynn, and New London, and have in these and other places satisfied ourselves of the quality of the gas supplied, it being tested, in most instances, in regard to its illuminating power and deleterious impurities.

2. Conversation with officials of the various gas-works visited and others. We have at all times been received by them in the most cordial manner, and all information which we could reasonably expect them to impart to us has been freely given. From some of these gentlemen we have received much important information, by comparing which, though mostly of a confidential nature, with the returns of various gas companies, we have been enabled to judge more fairly whether they were working as economically as was practicable, and in many other ways also have been able to arrive at conclusions, which perhaps could not have been attained in the common course of inquiry.

3. By means of the following printed circular, which was sent to all of the principal gas companies of the United States, from many of which full returns were obtained:—

To the President of the *Gas Company.*

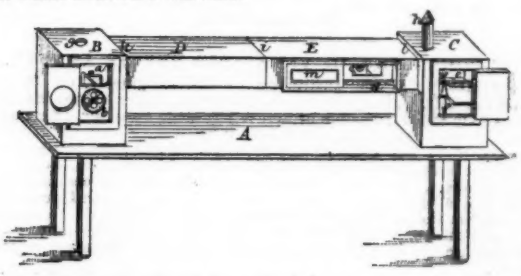
Dear Sir,—The Gas Commission, appointed by His Honour the Mayor of the City of Boston, are desirous of obtaining certain information relative to the manufacture of gas, and would feel under great obligations to you in receiving answers to such of the annexed questions as you may deem proper, with the assurance from us that such as you may so mark will be considered as confidential.

Amount of capital paid in?
Amount of bonds issued, and what interest they bear?
Capacity of the works?
Amount of gas manufactured per annum?
Amount of gas sold per annum?
Per centage of loss by leakage per annum?
Number of miles of gas-mains?
Number of benches of retorts, and average number in use?
Number of retorts to the bench?
Number of benches used for the manufacture of coal gas, and average number used?
Number of benches used for the manufacture of naphtha gas, and average number used?
Per centage of atmospheric air used in the naphtha gas?
Are the gases measured separately before being mixed in the holder?
Per centage of air in the mixed gas in the holder?
Amount of coal used per annum?
Kind of coal used for making the gas?
Kind of coal used for enriching the gas?
Amount of gas produced per lb. of coal?
Per centage of enriching coal used?
Is the Meilhenny dip seal used with success?
Is any other patent process used with success?
Is naphtha volatilized by fire or steam?
Is naphtha charged directly into the retorts?
Number of gallons of naphtha used per annum?
Price paid per gallon for naphtha?
Amount of gas produced from a gallon of naphtha?
Cost of gas, deducting coke and tar, in holder?
Cost delivered to the consumer?
Candle power of the gas at the works?
Candle power of the gas one mile from the works?
Specific gravity of the gas?
Number of men employed at the works?
Number of labourers employed by the company?
Annual cost of coal?
Annual cost of labour?
Annual cost of water?
Annual cost of purifying materials?
Cost of coal per cubic foot?
Cost of labour per cubic foot?
Cost of coal per ton at the works?
Cost of the enriching coal at the works?
What purifying material is used, lime or iron oxide?
What price per 1000 cubic feet is charged consumers?
What price is obtained for coke?
What price is obtained for coal tar?

4. Published reports in standard European and American gas journals. From these were obtained chiefly the accounts of the European gas companies, which are published in detail semi-annually, together with the returns of the Government inspectors, who are obliged to report periodically the result of their examinations.

It was, perhaps, unfortunate that we have been obliged by the order to examine all of the various processes for the manufacture of illuminating gas, since this necessitated the consideration of innumerable patent processes, all of which, however, with the exception of those in actual use in works of considerable size, were excluded as not being in a condition suitable for thorough examination, although the theoretical merits of most of them were carefully considered. Only those, which could be subjected to thorough examination, will be considered in the following pages.

The general method pursued in making our investigations was, in the first place, to determine the quality of the gas in those places visited by personal testing. In making the most important test—that by means of which the illuminating power is determined—we made use of a portable photometer, for which we are indebted to the kindness of Mr. C. D. Lamson, engineer of the Boston Gaslight Company, by whom it was devised, and under whose direction it was made.



This photometer consists essentially of four parts, represented by B, C, D, and E. (See diagram.) "A" merely represents the table upon which the instrument is placed, and can be extemporized by using the box in which the photometer is transported, and any ordinary table. The instrument is made of light wood, painted inside and out with a lampblack paint, containing a large amount of drying material, so as not to reflect any light. B is a box in which the photometer meter, *b*, is securely fastened. Above the meter is the burner, *a*, so arranged that the centre of the flame is directly beneath the centre of the hole, *g*, which, when the apparatus is mounted, is exactly 100 inches from the perforated tin chimney, *h*, beneath which is the standard candle; the centre of the gas and candle flames, therefore, are 100 inches apart. The door of B contains a hole through which the meter-dial can be read when the door is closed, thus preventing the entrance of any light into the chamber in which the gas-flame is burning. The box, C, contains the candle-balance, *e*, securely fastened in position. The balance used was Goodwin's balance, which permits of the weighing of the candle *in situ* while burning; the pointer, *f*, showing exactly when the 12 or 24 grains of sperm have been consumed. Firmly fastened to C, at *l*, is the hollow box, E, which contains the disc, *c*, placed in a moveable frame, the pointer upon which marks the candle power on the scale, *d*. When the photometer is in use, the opening above, *d*, is fitted with a little framework of blackened wood, to which is fastened by black cloth a black paper frame, which fits closely the face of the observer, enclosing that portion of the face between the middle of the forehead and the upper lip, so that no rays of light from without can possibly strike upon the disc while the observation is being made. When the apparatus is not in use, this mask, as it may be called, is removed, the moveable frame fastened with a thumb-screw, and the sliding door, *m*, closed and locked. Joined to E, by means of hinges on the lower surface at *i*, is the hollow box, D. D simply sets into B, at *k*, so that it can readily be separated. Thus all light is excluded from the inside of the apparatus, and all of the conditions necessary for the performance of a photometric test are fulfilled. The joint is made at *i*, simply for convenience of transportation, D, folding beneath E, and its end being fastened to C, by a catch. The two parts, C, D, E, and B, are fitted accurately into a large box, in which the apparatus is easily transported. By the use of this photometer, the objections incident to the employment of different instruments were avoided, since all of the tests were made by the same observer with the same apparatus.

The specific gravity was determined by an apparatus devised and made by W. W. Goodwin and Co., of Philadelphia. It depends for its principle upon the fact that the times required for two gases to stream out through a fine opening in a thin metallic plate are proportional to the squares of their densities. Knowing, therefore, the time and the density of one of the gases (air), we can easily calculate that of the other. The temperature and pressure must be the same in both cases. This apparatus consists of a glass cylinder for containing water; a glass tube divided into a number of equal parts for measuring the gas; a moveable cap, by means of which the graduated tube may be fastened into the cylinder; a stopcock attached to the tube, and a tip which contains a fine hole in a metallic plate, through which equal volumes of gas and air are made to pass under the same pressure. The times required are observed by means of a stop-watch, marking to the quarter of a second. The specific gravity of the air being 1·000, we calculate that of the gas by the following proportion:—

$$(\text{Air time})_a : (\text{gas time})_a = 1{\cdot}000 : x = \text{specific gravity of the gas.}$$

* By the courtesy of Captain Dresser, the editor of the *American Gaslight Journal*, we have received a copy of the evidence taken at the hearings referred to. It is of a highly instructive character, and we may yet have an opportunity of publishing some extracts from it.—Ed. J. G. L.

The amount of sulphur in the gas was determined by means of the London "Referees apparatus," in which a small jet of gas is burned in an atmosphere of ammonia. The sulphur of the gas will burn to form sulphurous or sulphuric acids, which will be at once neutralized by the ammonia. The steam (formed by the combustion of the hydrogen of the gas), with the ammonic sulphate and sulphite, is condensed and collected by being conducted through tubes filled with glass beads. These are thoroughly washed with distilled water, and the water added to the fluid collected during the operation. This gives us a solution containing all of the sulphur in the form of ammonic sulphite and sulphate. By boiling with nitric acid we convert it all to sulphuric acid, and estimate the amount of this by precipitating it with a solution of chloride of barium, washing and weighing the precipitated sulphate of barium. From this the amount of sulphur is readily calculated by the following proportion:—

116·5 (the equivalent weight of sulphate of barium): 16 (the equivalent weight of sulphur) = weight of sulphate of barium: x = weight of sulphur.

The amount of ammonia was estimated by passing the gas through a dilute solution of sulphuric acid of known strength until it was neutralized. The acid is coloured with a few drops of a solution of cochineal, and placed in a bulb tube. As soon as the acid is neutralized, the cochineal changes from a light red to a violet colour. The amount of gas passed through the bulb tube contains just that amount of ammonia which is sufficient to convert the acid in the bulbs to an ammonium salt, and knowing these amounts, it is easy to calculate the amount of ammonia in 100 cubic feet.

These tests were all performed at a distance from the gas-works, the gas always being taken from the burner of a consumer, and without the knowledge of the officers of the company. This last precaution was considered advisable, as enabling us to learn, as nearly as possible, from an examination at one or two times, the quality of the gas supplied to the consumer, and to avoid the possibility of the objection which might be brought forward by a rival company, or parties interested in some other process, that the gas was made richer or purer on account of the previous announcement of our arrival for the purpose of testing it. And it may be stated here that not much reliance has been placed upon results which have been obtained by a single test, or tests made during a single week, since it may happen that, for some good reason unknown to us, the gas may have been, during a short period, poor in quality. For example, at one time more than 52 grains of ammonia were found in 100 cubic feet of Cambridge gas, and upon inquiry it was found that the gas was tested just before a new washer was introduced into the works. Since that time the amount has been quite small.

(To be continued.)

THE COMBUSTION OF VEGETABLE REFUSE AS FUEL.

At the Meeting of the Institution of Civil Engineers, on Tuesday, the 30th ult.—Mr. G. R. Stephenson, President, in the chair—the paper read was "On the Combustion of Refuse Vegetable Substances for Raising Steam," by Mr. John Head, Assoc. Inst. C.E.

Hitherto there has been no opportunity of testing the value of such materials as straw, reeds, cotton stalks, brushwood, megass, &c., as fuel for steam-boilers, from pre-conceived notions in favour of coal and wood, the use and efficiency of which were well known. But in Hungary and South Russia, India, Egypt, the West and South of Italy, South America, and New Zealand, where coal and wood were scarce, the only way in which steam could be applied was by the employment of refuse vegetable products.

In 1872 experiments were made by the author and the late Mr. Schemioth, a Russian engineer, with a locomotive boiler adapted to a portable engine, in order to perfect the combustion of straw and other refuse. It was decided to inject the fuel automatically into the furnace, by an apparatus not unlike the feed motion of a chaff-cutter. The chemical composition of various materials, in their ordinary air-dried condition, having been stated, the average proportion of calorific effect found in practice to exist between coal and other products, when used as fuel, was shown by the following figures:—Thus, 1 lb. of good coal, or 2 lbs. of dry peat, or 2¼ lbs. of dry wood, or 2½ to 3 lbs. of cotton stalks, brushwood, or megass, or 3¼ lbs. to 3¾ lbs. of wheaten or barley straw, would evaporate 8 lbs. of water in an ordinary tubular boiler. From calculations it appeared that in England it would be five times as costly to use straw as to use coal under steam-boilers. But these figures were materially altered in the countries named, where the cost of coal would be three and a half times as much as that of straw. Taking an agricultural engine of 12 effective horse power, and the consumption of straw at 20 lbs. per horse power per hour, the produce of straw per acre would enable the engine to work from 12 to 18 hours.

A description followed of some of the earlier means by which straw had been burned under steam-boilers; as in Russia, by an adaptation of a brick furnace in a pit to the boiler of an ordinary portable engine, and in Hungary and in Wallachia, where a modification of that system allowed of a shallower pit being used. In one of the most recent engines, which was capable of burning almost every description of fuel, the fuel was forced, by a continuous mechanical feed, into the furnace, in a thin stream in the form of a fan. The fresh fuel was practically held in suspension for a short time, which allowed the separate stalks to become immersed in the flames. The long pieces of straw, reeds, or brushwood had the effect of stirring up the half-burnt material in the furnace, and keeping the whole in motion, besides permitting a free ingress of air. The apparatus, designed for feeding the refuse into the fire-box consisted of a pair of serrated rollers, which, in the case of engines of from 6-horse power to 20-horse power, were about 5 inches in diameter, and 18 inches long, placed at a minimum distance of a quarter of an inch apart; but the upper roller was capable of rising, so that the distance between the rollers could be increased to 1¼ inch. The under roller was set in motion by a strap from the crank-shaft of the engine, and both rollers, being connected by wheels with long teeth, made about 45 revolutions per minute; when the engine was getting up steam, the lower roller was turned by hand with an ordinary crank. The rollers were set in a cast-iron frame, fixed to the boiler by a hinge. To the front of this frame was attached a trough for holding the supply of vegetable fuel. To test the practical value of the apparatus, and to arrive at the best proportions of heating surface, and the best position for the automatic feeding arrangement, three engines, each of about 10 nominal horse power, were constructed by Messrs. Ransomes, Sims, and Head. Thus it had been determined that whereas for coal the areas of the grate, the fire-box, and the tube surfaces were 0·62 square foot, 2·8, and 15·24 square feet respectively per nominal horse power, those dimensions were for vegetable products, 0·93 square foot, 4·3, and 21·82 square feet per nominal horse power. Also that tubes 2½ inches in diameter gave better results in the consumption of vegetable refuse than tubes 2¾ or 3 inches in diameter, the size usually employed in the boilers of portable engines adapted for coal. It was next ascertained that when the fuel was injected into the fire at 5 or 6 inches from the top of the grate-bars, the greatest economy was obtained, there being a more rapid combustion with less smoke than in any other position. The combustion could be maintained with vegetable refuse containing more than the natural amount of moisture, by forcing the fuel into the hottest part of the fire, and by supplying it alternately on the right and left hand sides of the fire-box, so that the fire on one side was always clear and bright. To prevent the deposit of silica and slag on the grate-bars, the most efficacious system had been proved to be the use, underneath the grate-bars, of a sliding rake with five or six teeth, according to the width of the fire-box; the top of the teeth projecting about 2 inches above the bars. When the tubes were furred, a steam-jet, consisting of a wrought-iron pipe with a brass rose at one end, was inserted through the flap in the front of the boiler, and the whole of the silicious deposit was blown through the tubes into the smoke-box. In an accompanying table the author gave the proportions and weights of different portable engines, varying from 4 to 20 nominal horse power, constructed on the system described, and fitted with a single slide-valve, a single feed-pump and a branch pipe from the exhaust for heating the feed-water.

Modifications of the apparatus, for burning cotton stalks, had been applied to a tubular boiler, constructed by Messrs. J. and H. Gwynne, for supplying steam to a 12 nominal horse power pumping-engine in Egypt; also for burning megass, or sugar-cane refuse, in the furnace of one of the tubular boilers of His Highness the Khedive's sugar mills in Egypt, constructed by Messrs. Eastons and Anderson. The automatic feeding apparatus had likewise been adapted by Messrs. John Fowler and Co. to their steam ploughing engines, supplemented by a means for supplying vegetable fuel with a fork by hand, through an opening in the fire-box, fitted with a balance door, which closed immediately the fuel was inserted. The heating surface was much larger in these straw-burning than in coal-burning engines, while other alterations had been made; thus, the large driving wheels were in the forward part of the engine, under the centre of the boiler; the winding drum was under the smoke-box, in front of the driving wheels; the steering wheels were attached to a wrought-iron frame extending behind the fire-box. This frame besides carrying the hind axle served as the sides of the trough for holding the straw to be passed by the rollers into the furnace. The apparatus was driven by a pitched chain from the crank-shaft. In Russia, during the year 1876, two of these engines when ploughing 10 inches deep, had consumed, on an average, about 6 cwt. of straw per acre. The mean produce was about 2750 lbs. per acre; dividing that quantity by 672 lbs.—the consumption in ploughing one acre—it was found that 4·09 acres could be cultivated with the refuse straw produced by one acre. Comparing this result with the steam-plough trials at Wolverhampton in 1871, it would appear that 1 lb. of coal was equivalent to 4·17 lbs. of straw.

The difficulty of obtaining reliable information as to the performances of other straw-burning engines, which had been brought out both in England and in the United States, had prevented a general notice of all the various inventions being included in the paper. In conclusion, the belief was expressed that as the demand for mechanical appliances increased, so would the difficulties of obtaining the "best" qualities of fuel for steam-boilers in rural districts. It was thought, therefore, that the only method of rendering the use of steam power universal, particularly for agriculture, would be to construct the boiler of the engine so as to utilize the local supplies of combustible material of every kind.

Institution of Civil Engineers.—The council of this institution have recently transferred Mr. H. Gooch, engineer of the Cardiff Water-Works, from the class of associates to that of members. At the monthly ballot on the 6th inst., Mr. C. E. Botley, manager of the Wormwood Scrubs Gas-Works; Mr. W. J. Boys, borough surveyor, Walsall; Mr. A. Hardwicke, borough surveyor, Longton; Mr. W. J. Jones, Malta and Mediterranean Gas Company; Mr. P. W. St. George, deputy city engineer, Montreal; and Mr. R. H. Swindlehurst, superintendent of water-works, Bolton, were elected associates of the institution.

Weardale and Shildon Water-Works Company.—The half-yearly meeting was held at Darlington on the 5th inst.—Mr. H. Pease in the chair. In moving the adoption of the report, the chairman remarked upon the agreeable fact that they had 16,000 shares, and not a single arrear. During the first half year they had expended the sum of £50,771 4s. 2d., and the gross revenue for the same period had been £7184 2s. 10d., an increase of £1326 7s. 1d. He thought this a satisfactory result, considering the great depression in the trade of the district. 12,106 houses were supplied by the company, being an increase on the previous half year of 2166. The population supplied by water was over 60,000. The report having been adopted, it was resolved—"That a dividend, clear of income-tax, of 11s. 3d. per share on the Shares Act, 1866, 4s. 0·6d. per share of the First Issue Shares Act, 1875, and 10·8d. on the Second Issue Shares Act, 1875, for the half year ending Dec. 31, 1876, be, and hereby is, declared, and that it be payable on Wednesday, the 7th inst., to the proprietors on the register of the company on Jan. 23, 1877." The meeting having been made special, the following resolution was carried unanimously:—"That, in pursuance of the powers contained in the Weardale and Shildon District Water-Works Act, 1875, the company be authorized to borrow, on mortgage, the further sum of £25,000 (in addition to the sum of £37,500 already authorized to be borrowed under the powers of the same Act), in such sums, and at such rate of interest, not exceeding £5 per cent. per annum, as the directors of the company may think proper."

Wimbledon Gas Supply.—At the meeting of the Wimbledon Local Board, on Wednesday last, a deputation attended to present a petition complaining of the quality of the gas supplied to the parish, and requesting the interference of the board. Mr. Newitt, who introduced the deputation, said the board were probably well aware of the many complaints that had been made from time to time in the parish concerning the price, the quality, and the quantity of the gas supplied by the company. The gas was without doubt injurious to health, and that being so, the question come under the powers possessed by the board as the health authority for the district. For the last few weeks a great deal of improvement had been noticeable in the quality and quantity of the supply. He did not say that this was on account of the agitation, but it had taken place since the committee of consumers had been formed. Gas was very much cheaper in other districts similarly situated, and there was no reason why it should be exceptionally dear in Wimbledon. The board had power to appoint a gas inspector, who could keep the company up to the proper standard. It had been said that any five ratepayers could take the matter in hand and compel the company to allow a test of their gas, but the ratepayers naturally looked upon the board as the authority, which should deal with matters of the kind. He, in conclusion, drew attention to the fact that the board could take the making of gas into their own hands, and could in that way put considerable pressure upon the company. The Chairman pointed out that the board had had the question several times before them, and on one occasion succeeded in obtaining a reduction of 6d. per 1000 feet. Personally he had a very strong objection to the quality of the gas, as it was very impure, and soiled the ceilings of rooms very quickly. The board would give their best attention to the matter, and would no doubt bring pressure to bear upon the company should the gas again fall below its present improved standard. The deputation, having thanked the board, withdrew. The discussion on the petition was adjourned until the next meeting.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There has been only a moderate amount of business doing here during the week, whether in respect of raw materials, pig iron, or finished iron, each of which is nominally firm in price, but in reality to be purchased at rather under the quoted prices of makers.

There continues to be a considerable tonnage of Northamptonshire and North Lincolnshire ore brought here, as well as some few consignments of late from the Mid-Lincolnshire district, where new deposits are just being opened out. North Lincolnshire pig also has a fair share of patronage amongst the West and South Yorkshire ironmasters, some of it being of very fair quality indeed, whilst other brands contain a large admixture of cinders.

Local pig is selling very well in Staffordshire and Lancashire in competition with the native products there, but at present the demand is not so large as to lead to the supposition that higher prices will be obtained for some time henceforward. The foundries near this town are rather better employed just now; consequently I find it chronicled in the local papers that a large number of additional men have been put on in the pipe shops at Staveley, the largest local concern devoted to that class of work. Whilst speaking of Staveley, I may say that the directors of the company have just declared an interim dividend on the various classes of shares equal to about 8½ per cent.—a division of profits which is, to say the least, equal to the highest expectations of the shareholders.

What I have prophesied, without venturing to infer much, in respect of colliers wages, is now on the point of becoming an accomplished fact, inasmuch as the associated coalowners of South Yorkshire and North Derbyshire have called a general meeting for the purpose of considering the best steps to be taken to reduce their miners wages to the level of the remainder of the country. At present the local miners are receiving about 11½ per cent. more than the colliers of any other district. At the pits of the Sheffield Coal Company, the Nunnery Colliery Company, Denaby Main, Strafford, and other collieries, many men are being discharged, and others only kept on lower pay. Trade still rules excessively quiet in all classes of fuel.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is no material change to notice in the position of the coal trade of this district, and there is little or no prospect of improvement. The season is now too far advanced to expect any of the usual winter demand for house fire classes of coal, and in other classes of round coal suitable for gas-making purposes there is very little doing in the way of new business beyond a few shipping orders at about late prices. Common classes of coal are a complete drug, and engine fuel is difficult to dispose of. Although list rates nominally are not lower, colliery proprietors have to take less for large orders, and prices are very irregular in the open market. Good Arley coal at the pit mouth is quoted at 10s. 6d. to 11s.; Pemberton four-feet, 8s. 6d. to 9s.; common coal, 6s. 6d. to 7s. 6d.; burgy, 5s. 6d.; and slack, 2s. 6d. to 3s. 6d. per ton; but for sales in bulk many of the coalowners are willing to take lower prices than the above.

Large numbers of the pits have been put on short time, and colliery proprietors complain that prices have now been cut so low that it is exceedingly difficult for them to hold their own, and there are very few collieries which are now working at a profit. In some quarters a substantial reduction in wages is being strongly urged, but several of the large firms are averse to such a step, as they anticipate that it would simply be followed by a further fall in values, which would leave them in quite as bad a position as before.

The iron trade continues in a very depressed condition, and although makers in most cases are holding for late rates, there is a great deal of underselling, and what little business is being done is chiefly going into the hands of middlemen, who are offering iron at fully 1s. per ton below the makers quotations. The local makers of pig are still altogether out of the market, but they maintain late rates, which they contend are the lowest they can afford to take without an absolute loss on the cost of production. Lancashire pig iron, delivered into the Manchester district, is quoted at 56s. 6d. to 57s. 6d. per ton for No. 3 foundry, 54s. 6d. to 55s. 6d. per ton for No. 4 forge; Middlesbrough, 53s. 9d. for No. 3 foundry, and 52s. 6d. per ton for No. 4 forge. The finished iron trade is quieter, very few new orders are coming to hand, and many of the forges are not now fully employed; but prices are about the same, local makers asking £6 12s. 6d. to £6 15s., and Staffordshire makers about £7 per ton for bars, delivered into the Manchester district.

A magnificent presentation of plate, valued at about £250, was on Tuesday last made to Mr. G. C. Greenwell, C.E., F.G.S., as a recognition of his high character and abilities as a mining engineer, and the eminent services he has rendered to the coal trade generally. Mr. Greenwell's retirement from this district has been made the occasion for the presentation, which took place at a complimentary dinner, held at the "Church Hotel," Manchester, and at which there were present the principal representatives of the coal trade throughout Lancashire, Cheshire, and North Staffordshire.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England remains in the same dull state as reported last week. The shipments from the Tyne Dock have not been so good during the past week as in January. Business has been less active in the despatch of best gas coals, and though tonnage is somewhat scant, the rates paid to sailing ships, upon the whole, have been lower, and the few coasting orders which have been in the market have been taken up rapidly. There are more vessels in the harbour than there is employment for. Quotations for small sailing ships to load coals have been as follows:—London, to deliver at the wharves, 6s. 6d. (7s. 6d. bricks); Poole, 7s. 6d.; Littlehampton, 7s. 9d.; Isle of Wight, 9s. per ton; and Plymouth, £7 per keel. French business is quiet, the large gas companies having apparently laid in their stocks for the winter. The figures current are—Caen, £9; St. Valery, £9 18s.; Granville, £9 to £9 5s.; Esney, £9 10s. per keel. Rates for steamers to load coals for the Mediterranean have been about 10s. per keel less than the week before last. The prices of best gas coals do not alter, they are about 9s. 6d. per ton; moderate qualities range from 6s. to 7s. per ton. Inferior sorts are very bad to sell, even at these low quotations; and most of the second-class Durham collieries are, like the whole of the pits in the Northumberland districts, working upon half time.

The trade dispute in the Durham colliery district in regard to deputies is not settled; it is an open question which is causing a good deal of irritation amongst the pitmen.

House coals are quoted in the Tyne at 11s. per ton best; inferior are 1s. per ton less money. The mild weather is stopping all demand. The house coal trade of the North of England is in a very poor way, and few of the collieries are paying expenses.

General manufacturing business continues in a very dull semi-collapsed state. The iron trade is feeling the effects of the uncertainty which prevails in the East.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

A special meeting of the Police Commissioners of Johnstone was held last Thursday night, for the purpose of considering whether or not the Burghs Gas Supply (Scotland) Act, 1876, should be adopted in and applied to the burgh. After a fruitless attempt to delay consideration of the question for fourteen days, on account of the absence of four or five members, three of whom were known to be in favour of the adoption of the measure, it was unanimously resolved, on the motion of the chairman, to adopt the Act.

The same subject was under the consideration of a special meeting of the Town Council of Dumfries on Friday week. The Provost, in explaining the object of the meeting, said, if the former resolution were confirmed, it was still in the power of the ratepayers to control their decision, and, if they chose, to render their proceedings inoperative. Moreover, the resolution bound them to no exact terms, but simply put them in a position to deal with the gas proprietors on terms which, in their opinion, were conducive to the interests of the burgh. On the motion of Bailie Wood, seconded by Bailie Nicholson, the resolution of the 22nd of September last was confirmed, and the Gas Act adopted. Bailie Wood said the whole tendency of modern legislation had been towards the transfer of such undertakings as gas and water from private companies to communities. Previous to last year those transfers were of an exceedingly costly character, inasmuch as a private Bill had in each case to be obtained. After some further remarks on the subject, he said that in Leeds, where the price of gas was 3s. 3d., the profit for last year to the ratepayers was £36,000. The transfer of the works of the Dumfries Gas Company to the Corporation, if it took place, would be a very great saving to the inhabitants, for, taking the quality of the gas as it had been supplied, and was now being supplied, it was exceedingly dear at 4s per 1000 cubic feet.

The gas-rental for Dundee, collected during January was stated at the last monthly meeting at £5889 15s. 6d.

The following are the last results to hand regarding the quality of the Perth gas:—Maximum, 29·69 candles; minimum, 28·68 candles; average, 29·06 candles. On two occasions the gas made at the Dawsholm station of the Glasgow Gas Corporation, for the week ending the 3rd of February, was under the minimum illuminating power fixed by the Act of Parliament. The highest maximum was 28·85 candles. Professor Brazier reports that the gas supplied by the Aberdeen Gas Corporation was tested by him on the 18th of November, and 26th and 29th of December, 1876, when he found the mean illuminating power to be, respectively, 30·17 candles, 30·80 candles, and 30·50 candles. The gas was tested on several times for sulphuretted hydrogen, ammonia, and carbonic acid, and on no occasion could more than traces of ammonia and carbonic acid be detected. An Inverness paper says that the gas supply of the town was greatly improved for some time, but that recently there appears to have been a slight falling off. It is said that it would be satisfactory to have an official test applied periodically, and the result published in the newspapers. Bailie Wood is still keeping up his weekly testings of the gas supplied in Dumfries. Leaving out the towns which I have already mentioned in this paragraph, his return for the week ending Feb. 3, gives the following results as to illuminating power:—Dumfries, 20·80 candles; Edinburgh, 30·63 candles; Leith, 27·83; Greenock (monthly average), 30·17; Paisley (monthly average), 28·86; Kirkcaldy, 28·00; Kilmarnock, 28·05; Dundee, 26·80; Stirling, 28·00; Galashiels, 29·00. The prices range from 3s. 9d. per 1000 feet at Galashiels to 5s. at Kilmarnock.

On Tuesday last, the annual meeting of the shareholders of the Kilmalcolm Gas Company, Limited, was held, when a dividend of 2 per cent. was declared, and it was agreed to reduce the price of gas to consumers from 10s. 6d. to 9s. 7d. per 1000 cubic feet—a reduction of 11d.

The fifth annual festival of the *employés* of the Partick, Hillhead, and Maryhill Gas Company took place last Friday night. Mr. James Hislop, manager, presided. Among those present were—Provost Shaw, Maryhill; Provost Cowan, Hillhead; Messrs. Wilson, town-clerk, Hillhead; M'Leod, Glasgow; M'Gilchrist, Dumbarton; Crawford, Hillhead; and the Rev. J. M'Crae, Maryhill. After tea, the chairman, in the course of his address, said it was five years since he cut the first turf of the company's works, and four years since they began to make and send out gas. By that time they had 32 miles of pipe laid down, but now they had upwards of 70 miles of piping, the sizes ranging from 2 to 30 inches in diameter. Addresses were also delivered by other gentlemen present.

At the ordinary meeting of the Town Council of Aberdeen, held last week, there were submitted the minutes of the Gas Committee, which contained a report from Mr. Smith, the manager, in reference to the fire which took place in the works about a month ago. On the recommendation of that gentleman, it was resolved to reconstruct the roof of the purifier-house, and to employ wrought iron and slates in doing so, and that a new fireproof meter-house should be erected. The committee recommended that Mr. Smith's salary should be increased from £350 to £450 per annum, which was unanimously agreed to.

The monthly meeting of the Police Commissioners of Motherwell was held last Tuesday evening, when the clerk read the agreement between the Public Works Loan Commissioners and the burgh of Motherwell, for £15,000, for the construction of the new water-works, the sum to be repaid in 50 years at the rate of £4 13s. 2d. per cent. per annum, when the whole of the £15,000 will be paid up.

The commissioners of the burgh of Wishaw have agreed to instruct their engineer, Mr. Tait, to survey a site lying between the two reservoirs at present in use, with the object of providing an additional supply of water storeage to the extent of from 30 to 35 million gallons, the former larger scheme being too expensive and otherwise unsatisfactory.

Messrs. Hawksley (London) and Leslie (Edinburgh) have just visited Perth with the view of getting up the case for the opponents of the new Water Bill.

The Dundee Water Commissioners have lodged their detailed statement of claims against the water contractors in the case which the latter have raised in the Court of Session. The "proof," which has been fixed to commence next Wednesday, is expected to last several days.

Business was done in the Glasgow pig iron market on Friday forenoon at 56s. 8d. 25 days, and the market closed for the week, buyers 56s. 6d. cash and 56s. 7½d. one month; sellers 1½d. per ton more. In the early part of the week there was a downward tendency, but towards the close the market recovered.

Coal sales are comparatively unimportant. The demand is small, and prices are even being reduced to secure orders.

ALFRETON GAS SUPPLY.—At the meeting of the Local Board of Alfreton, on the 6th inst., a discussion ensued with respect to the lighting of the town with gas, and the great expense incurred during the last quarter for gas. Special reference was made to the hours for lighting and extinguishing the lamps. It was resolved that an agreement should be made, between the board and the gas company, to the effect that the latter supply the former with gas at 4s. 6d. per 1000 feet, and such agreement to continue in force for three months. It was also resolved that the lamps should be put out at one o'clock instead of three o'clock as heretofore.

BATH WATER SUPPLY.—The Local Government Board have authorized the Corporation of Bath to borrow £900 for the extension of water-mains.

QUALITY OF THE BIRMINGHAM GAS.—Mr. Thos. Jackson reports that during the month of January, at the four gas-making stations of the corporation, there were 18 examinations made of the illuminating power of the gas supplied to the borough. The maximum light in sperm candles was 18·93; minimum, 16·21; average, 17·52. The parliamentary standard is 15 candles, with Sugg's No. 1 "London" burner.

NEWCASTLE AND GATESHEAD WATER COMPANY.—The Parliamentary Committee of the Newcastle Town Council have recommended the Corporation not to oppose the Bill of the company, on condition that a clause be inserted providing that, in addition to the 53rd section of the Water-Works Clauses Act, it be provided that in case of default of providing a sufficient supply of wholesome water fit for domestic purposes and effectually filtered, the company shall be liable to a penalty of not exceeding £10 for every day during which such default shall continue, provided that such penalty shall only be sued for and recoverable by the Corporation of Newcastle.

DREGHORN GAS SUPPLY.—By the enterprise of a number of gentlemen in the village of Dreghorn and neighbourhood, the inhabitants have been furnished with the means of lighting their houses with gas. A company, with a capital of £3000 was formed at the end of last summer, and the works were completed so far as to admit of the gas being turned on on the 3rd inst. The works, which have been erected at a short distance from the village, are capable of supplying 7000 feet per diem, with a storeage capacity of 10,000 feet, and cost £1800. It is proposed to extend the supply to Croft Inn, about a mile and a half from Dreghorn. The gas will be sold at 7s. 6d. per 1000 feet.—*Glasgow Herald.*

COAL TAR A PRESERVATIVE OF WOOD.—A correspondent of the *American Cultivator* says: "We often notice that coal tar is named as a preservative of wood, and the comment is correct if those who advise would add that, in using, it must have the acid in it destroyed by mingling fresh quicklime with it. Half a bushel of lime, freshly dissolved and mingled with a barrel of tar, has kept posts, saturated with it and planted in clay ground, perfect over 20 years." [The acids in coal tar are really preservative agents, and a coating of pitch keeps out all atmospheric moisture. When wood decays after coal tar has been applied, it may be assumed that the wood was wet at the time of the application, and that the confined moisture induced eremacausis.—ED. J. G. L.]

CROFT AND HURWORTH GAS COMPANY.—The half-yearly meeting of this company was held at Darlington on the 5th inst.—Colonel Scurfield, the chairman, presiding. The directors recommended a dividend at the rate of 6 per cent. for the last half year. The accounts showed an income of £392 12s. 7d., and an expenditure of £232 18s. 2d., leaving a balance available for dividend of £159 14s. 5d., and a balance of £39 14s. 5d. to be carried to the reserve-fund. The directors expect that during the present half year they will have to make some extensions or renewals, in order to meet the growing demand for gas, and increase the size of the mains in the village of Hurworth. The report was passed, and Mr. R. Brown, of Croft, was appointed a director in the place of Mr. Harrison, deceased. The chairman and other officers were re-appointed.

STAFFORD GAS COMPANY.—On Monday, the 5th inst., the half-yearly meeting was held at the offices—Mr. T. Turner, chairman of the board of directors, presiding. The report stated that in consequence of the corporation having obtained compulsory powers to purchase the undertaking of the company, the directors were taking the necessary steps to carry out the transfer on as favourable terms for the shareholders as they considered right and just to both parties. It had been expedient to apply for powers to increase the capital of the company, which the directors had done under the Gas and Water Facilities Act, but the issuing of the shares would depend upon the negotiations now in progress with the corporation being carried out. The directors recommended the maximum dividend to be paid—viz., 10 per cent. per annum on the old shares, and 8 per cent. per annum on the new, free of income-tax. The report was adopted, and the retiring directors (Messrs. T. Turner and W. Bowen) were re-elected. Mr. M. Banks, of Birmingham, was elected to fill a vacancy on the directorate caused by the death of Mr. J. Kenderdine. Mr. Tilston was elected auditor, in the room of Mr. J. Nevitt, who declined nomination on account of his engagements with the Town Council. The usual votes of thanks were passed.

RUSTING OF IRON.—In *Dingler's Polytechnic Journal* will be found the results of a series of experiments made by A. Wagner, on the production of rust upon slips of iron exposed to water containing various salts in solution, and in the presence of air free from carbonic acid, and of air containing that gas at various temperatures, and also in sealed tubes from which the air had previously been expelled. Whilst pure water in presence of air caused the iron to rust, this was found to occur more rapidly if carbonic acid was present at the same time, and the production of rust was materially increased by the presence of the chlorides of magnesium, ammonium, sodium, potassium, barium, and calcium, the first mentioned being the most active in this respect. Iron immersed in river water, concentrated by evaporation, was found to rust more slowly than when in distilled water; and whilst the presence of oils or fats greatly diminished the rapidity of rusting, it was found that alkalies prevented it entirely. A solution of chloride of magnesium, in the absence of air, attacked iron at the temperature of boiling water, but solutions of the chloride of sodium, potassium, barium, or calcium, were not found to do so.

PROPOSED PURCHASE OF THE PENRITH GAS-WORKS.—On Thurday last, Mr. Morgan, an inspector from the Local Government Board, held a public inquiry at Penrith with reference to the scheme of the local board to purchase the gas and other works connected therewith. Mr. C. Fairer (clerk), Mr. Hepworth, of Carlisle, and Mr. Malam, gas manager, from Dumfries, as arbitrator, represented the local board, and in the interest of the gas company there were present the chairman (Mr. Nanson), Mr. W. Little, solicitor to the company, Mr. Dempster, Halifax, arbitrator. At the outset Mr. Fairer laid before the commissioner a statement of the proceedings of the local board in reference to the gas question. He then read a very concise and intelligible report on the condition of the works, prepared by Mr. Hepworth. Their area, he said, was 5726 square yards, including a plot of land recently acquired for the purpose of future extension. The site of the works was both suitable and convenient. The works were erected in 1830, and considerable additions appear to have been made about the years 1851 and 1864. Mr. Hepworth in general terms expressed his approval of the buildings. The existing retorts are equal to the daily manufacture of about 100,000 cubic feet of gas. The chimney is 80 feet high and 2 feet diameter, and appeared to be quite equal to the requirements. The condensers and scrubber were not sufficiently large. There are three gasholders. Two of these will contain about 10,000 feet of gas each, and the third and last one erected, about 100,000 cubic feet of gas, the storeage capacity being about 120,000 cubic feet if the three holders were sound. He was not in a position to speak as to the condition of the gas mains and services, inasmuch as he had made no examination of them. It was more than probable, however, that both mains and services require considerable repairs. The quantity of gas made at the works during the year 1876 was 17,407,500 cubic feet, or rather more than 2000 cubic feet per head of population, which was about the average of towns about the size of Penrith. The charge for gas in Penrith at the present time was 4s. 10d. per 1000 cubic feet, and the illuminating power 14 candles. The price of gas to public lamps, of which there are 119, is 3s. 8d. per 1000 feet—a low price, and the average cost per lamp per year for gas alone was about 45s., the lamps burning 2000 hours per annum. In concluding his report, Mr. Hepworth said that the gas-works at Carlisle were acquired by the corporation under the powers of a special Act, passed in 1850, at a net cost of about £12,000. When it was proposed to constitute a new company, the price was reduced from 8s. to 6s. 8d.; and when in 1847 the corporation practically controlled the works, the price was reduced to 5s.; in 1852 it was further reduced to 4s. 2d.; in 1861 to 4s.; in 1863 to 3s. 8d.; in 1865 to 3s., at which price it is now sold, whilst the quality of the gas has been increased from 11 to 19 sperm candles. The profits realized in Carlisle last year were £5401 4s. 7d.; and from the time the gas-works were acquired £69,736 17s. 5d. The works have been paid for out of the profits, and the amount of assets in excess of liabilities is now £43,393 13s. 2d. He considered that the gas consumers of Carlisle had reaped large advantages from the possession of the gas-works by the corporation. Mr. James Graham and Mr. William Nevison complained that the probable cost had never been mentioned, consequently the ratepayers were in the dark on that question. It was explained, however, that if a price was named it might influence the decision of the arbitrators. The commissioner explained that the board now merely sought to obtain a Provisional Order under which a valuation might be made; but it did not follow that if the board thought the works too dear they would go on with the purchase. Mr. Little said the company would offer no opposition. They would be quite content whether the order was granted or not. After some further conversation the inquiry terminated.

Register of New Patents.

940.—BRAY, G., Leeds, "*Improvements in gas-burners.*" Patent dated March 4, 1876.

These improvements have reference to common metal burners, but more particularly to that class of burners which are partly constructed of earthenware, or other non-corrosive material, such parts being generally fixed in a metal case, in a similar manner to the arrangement described in Patent No. 2335, in the year 1872.

The invention relates to the burner known as the "fish-tail," or "union jet." In ordinary burners, the holes that produce the desired form of flame are made round, and formed in the burner at an angle from about 40° to 50°, causing the flames from the holes to impinge upon each other at that angle. In these improvements the holes are made by preference from between 20° to 40°, or any more obtuse angle up to a straight horizontal line. By combining the elliptical shape of hole with the altered angles, a spread of flame is obtained whereby the gas may be consumed at a much lower pressure than with the ordinary burner.

The next part of these improvements is applicable to "bat's-wing" and other burners, and consists in an arrangement in the burner for diminishing the pressure or supply of gas to that part of the burner which imparts the desired form to the flame. This arrangement is also intended to strengthen the outer case of metal in that part most liable to rough usage from the gasfitter's pliers, by having a washer or plate of metal or earthenware, or the two combined, or other suitable material, made to fit tightly in the interior of the case; and when the case is in one part, it is preferred to place the washer in the top part of the taper formed for the screw. It is made of any suitable thickness, and may be recessed or not on the top side. In each washer a hole is provided, passing vertically through it, the size of the hole varying in accordance with the size or number of the burner.

When a metal washer is used, in a hole therein is inserted an earthenware or other non-corrosive tip or bush, having the requisite hole in the centre. From this supply or diminishing arrangement, as with all ordinary known means for diminishing the pressure or supply of gas by confined aperture or apertures in the burner, great agitation of the gas ensues, which shows itself in the flame; this is particularly observable in the "union-jet" burner. To suppress this agitation of the gas there is used, in combination with the pressure-diminishing arrangement, one or more layers of muslin or other woven or fibrous materials, which are fixed in the interior of the case by means of a ring, at a suitable distance from the washer. This not only has the effect of steadying the gas, but also prevents the hissing or whistling.

The improvements further consist in placing a diminishing tip or bush, with vertical hole at the bottom of the burner socket, placing the muslin arrangement a suitable distance therefrom; or this tip or bush may be placed in any suitable position within the case.

The above arrangements have the effect of giving a steady flow of gas, consequently a steady and noiseless flame.

949.—STUART, C., Halifax, "*Improvements in the construction of taps or valves for controlling and regulating the flow of steam, water, gas, or other fluids.*" Provisional protection only obtained. Dated March 6, 1876.

This invention relates more especially to the mechanism for operating the valves to or from their seats as required, and consists in arranging one or more levers, in connexion with the valve within a casing, and hinging or jointing them together to the main spindle, or by the application of a worm wheel and screw operating a cross spindle, which is attached to the valves in such manner that, upon the main spindle being moved to open or close the valves, a simultaneous action will be produced, causing the valves to travel laterally to the spindle, thereby presenting an opening for the outlet of the fluids.

961.—PLUSH, R. H., Liverpool, "*Improvements in pumps.*" Provisional protection only obtained. Dated March 6, 1876.

In constructing a pump according to this invention, the barrel or cylinder, made of any known form, is fitted at its lower end with any suitable description of foot or suction valve, either in a distinct valve-box or fitted to the end of the pump. The pump-barrel or cylinder has a hollow ram or plunger, the head or outer end of which is provided with a discharge or delivery valve, either in a distinct box attached or fitted in the head or outer end of the ram or plunger. This works by preference on a slipper or other suitable guide, and from the discharge or delivery valve at the head of the ram or plunger a pipe is continued of inside diameter equal to that of the ram or plunger. This pipe works in a suitable stuffing-box from which is led the discharge or delivery pipe of the pump.

968.—SMITH, W., Kennington, Surrey, "*Improvements in dry gas-meters.*" Patent dated March 6, 1876.

According to this invention, the upper rim of the diaphragm of the meter is made somewhat larger than the lower one, which latter is of about the ordinary size, and the leather is preferably shaped so that it has the bulge nearer the upper rim. The rims are made in working preferably to approach one another, so that the bottom of the upper rim may pass below

the top of the lower rim if necessary. A diaphragm is thus obtained which can register considerably larger volumes than the ordinary ones, and the action of which is better, the friction is lessened, and less leather is used.

970.—Sugg, W. T., Vincent Works, Westminster, "*Improvements in gas burners and fittings, or parts thereof, and in the method of manufacturing the same.*" Patent dated March 6, 1876.

This invention has for its object the improvement of gas-burners, either Argand or flat-flame, whereby the arms attached to the same for the purpose of carrying shades, screens, or globes, together with the fittings for their suspension or support, may be made by a reduced number of operations to that by which they have hitherto been made, more uniform, rigid, capable of increased ornamentation, and at a comparatively reduced cost.

The invention consists in constructing metallic moulds, being counterparts of the burner, or a portion of the burner in the case of an Argand burner, and in reference to a flat-flame burner, of the supports and case in which the burner tip or top is fixed. These moulds are made in two, three, or more pieces, and in them are laid wires of copper, steel, or other suitable metal for giving rigidity and strength to the arms. Melted metal, consisting of an alloy of tin, lead, and antimony, is then poured into the moulds, and on the metal becoming cool the moulds are separated, and the burner consisting of those parts capable of being cast together, that is, with their arms or supports either ornamented or not, are withdrawn in one piece, requiring but little additional work to finish them ready for use.

The fittings, by which burners are frequently suspended or otherwise supported, it is proposed to make by forming metallic moulds in which the tubes for the conveyance of the gas or support of the burner may be laid. Melted metal is then poured into the moulds, thus uniting the tubes, ornamenting them with appropriate devices, and providing the shell for the insertion of a suitable plug or tap to form a stopcock.

971.—Sugg, W. T., Vincent Works, Westminster, "*Improvements in public light gas-meters, the receptacles for containing them, and connexions to the same.*" Patent dated March 6, 1876.

This invention has for its object the construction of gas-meters and the connexions thereto, specially adapted to ascertain the consumption of gas in public lamps, and in the receptacles for containing the meters so that they may be conveniently accessible for replenishing with liquid, clearing out the supply and service pipes, and for adjustment for repair, and for ascertaining the quantity of gas consumed by the lamps to which they are attached.

The apparatus consists of a meter-wheel or drum of comparatively shallow depth but large diameter, mounted on a frame attached to an enclosed front chamber, the front of which is made removable. This frame and chamber are enclosed in another case or chamber capable of containing the liquid in which the drum may revolve. On the top of this case is fixed the index, filling tube, and draw-off tube, together with the inlet and outlet for gas.

The whole of the foregoing constitutes the meter, which is placed within a cast-iron receptacle to be embedded in the ground, the receptacle being provided with a cover having a glass plate through which to view the index, and cross-bars, lugs, and screws, whereby, with the aid of india-rubber packing, the case may be made securely gas and water tight. The inlet and outlet connexions are fixed to the exterior of this case, and are arranged in such a manner that the gas may be shut off therefrom, and the pipes cleared, should any obstruction occur therein, without the necessity of disturbing them from the surrounding soil. On the inside, the inlet and outlet connexions with the meter are made of flexible tubing (of the kind described in patent No. 2842, Aug. 12, 1875) and metallic couplings. The upper part of the outside case consists of a frame and hinged flap-door cast separately from the other parts, but capable of being attached thereto and adjusted in such a manner as to make the upper surface correspond in level or inclination with that of the pavement.

The whole of the cases are made of cast iron, and the flap door is secured by means of a lock or fastening, which, while it admits of being easily opened by a suitable key, is not likely to become fixed with dirt.

988.—Lake, W. R., Southampton Buildings, London, "*Improvements in gaseliers.*" A communication. Patent dated March 7, 1876.

The object of this invention is to produce improved mechanism for sustaining the weight in a gaselier of the extension or drop tube and its lights, and consists of a drop or extension tube, provided externally with a spiral rib or equivalent device, a frictional spring, and a two-part clutch. These are so arranged that when the drop tube is at rest the clutch will be engaged and provide sufficient frictional power to support the extension or drop light tube and its attachments; and that when the drop tube is being moved upward the clutch will be disengaged and offer no resistance.

989.—Crossley, F. W., and Bridgett, G. A., Manchester, "*Improvements in direct-acting steam-pumps, applicable also to pumps worked by compressed air or other fluid pressure.*" Provisional protection only obtained. Dated March 7, 1876.

This invention relates to a construction and mode of operating the valves of pumps which are worked directly from a piston moved in a cylinder by steam, compressed air, or other fluid pressure, the admission and emission of the working fluid being governed by a valve or slide moved by the pressure of the working fluid admitted to act on it through ports governed by the piston or by tappets moved by the piston. The improvements consist in adapting, to a pump so worked, a slide of a kind similar to a steam slide, in lieu of the clack or other valves ordinarily employed for the passage of the water to and from the pump-barrel, and in working such slide by connecting it directly to the slide of the working cylinder, so as to be moved by and simultaneously with it.

1003.—Wright, L. T., Harrow Road, London, "*A new process for revivifying foul gas lime and obtaining the volatile products therefrom.*" Provisional protection only obtained. Dated March 8, 1876.

According to this invention the foul gas lime is distilled by subjecting it to heat in a retort communicating with a condenser, and provided with a pipe or pipes for the introduction of steam to assist in driving off the volatile matters. The material, after its removal from the retort, is treated, preferably while hot, with sufficient steam or water to convert the protosulphide of calcium into sulphydride of calcium and hydrate of lime, whereupon it can be used again for the purification of crude coal gas, and when spent can again be revivified in the same manner. By effecting the condensation at a sufficiently low temperature bisulphide of carbon, which is one of the volatile matters expelled by the distillation, can be obtained in a liquid form.

1013.—Caldwell, A., Strathbungo, N.B., "*A new or improved apparatus for controlling or regulating the flow of water or liquids in dwelling-houses, factories, and other buildings, the same being applicable as a water or liquid meter.*" Patent dated March 9, 1876.

This invention consists of a cylindrical chamber or vessel, closed at both ends, and within which a piston composed of leather, india-rubber, or other equivalent material, is so placed as to fit water-tight around the interior. The piston is fixed on one end of a rod, on the other end of which a smaller piston is so placed as to fit water-tight around the interior of a tube about half the length of the cylindrical chamber. At that end of the rod whereon the larger piston is situated, a valve is fixed which alternately opens and closes the entrance to an exit-pipe attached to the end of the chamber. When the cock or valve of the service-pipe is closed, the pressure of water within the apparatus acting upon the smaller piston draws the larger one towards the centre of the chamber, two or more small openings being made in the larger piston to permit of the passage of water through it, and allow of such motion being effected. The quantity of water passed through these holes is discharged by the pressure of water against the inner side of the larger piston, forcing it towards the end of the chamber or vessel.

Under a modification of the apparatus it may be made to discharge at both ends, and instead of making holes in the larger piston, a pipe or pipes may be employed to conduct the water from the inlet to the outlet side of the piston.

The apparatus may also be provided with an indicator, and employed as a meter for indicating the flow of water or other liquids.

1014.—Hoeftmann, O., Charlton, Kent, "*Improvements in gas lighting, which consists in adjusting the supply of air to the burner so as to give maximum light for a given consumption of gas.*" Provisional protection only obtained. Dated March 9, 1876.

This invention consists in adjusting the supply of air by regulating the size either of the orifice where the air inflows to the burner, or of the efflux orifice, or both. This may be accomplished by adjusting a diaphragm at the top of the chamber in which the light burns, so as to regulate the distance of the edges of the chimney glass and the chamber, the space between the edge of the chimney and the edges of the diaphragm being the efflux orifice.

1034.—Kidd, J., Dartmouth Street, Westminster, "*Improvements in gas-producing furnaces, and in the methods of utilizing the gases generated therefrom.*" Application dated March 10, 1876. Void by reason of the patentee having neglected to file a specification in pursuance of the conditions of the letters patent

This invention is an improvement on patents Nos. 520 and 531, of 1873, and consists of various modifications of the apparatus which cannot now be described apart from the drawings which accompanied the former specifications.

1057.—Malroy, A., Rochester, "*A new water-meter, applicable also for measuring other liquids.*" A communication. Patent dated March 11, 1876.

The aim of this meter is to measure accurately the quantity of water or of any other liquid running from a cock, whatever the variable pressure of the column of liquid may be. It can be situated at any distance from the place where the liquid originates, without causing any alteration in the accurateness of the measuring of the liquid.

1063.—Jones, H. E., Bow, Middlesex, "*Improvements in apparatus for regulating and correcting alterations in the pressure of gas flowing through street-mains.*" Provisional protection only obtained. Dated March 11, 1876.

This invention relates to means of reducing the increase of pressure which is produced at the upper part of a gas-main which ascends an incline, and of restoring the pressure to the same as that at the foot of the incline. This reduction or restoration is maintained in exact relation with every rise and fall of the initial pressure, a result which differs from that obtained by the use of the ordinary regulators employed for this purpose, which have simply the effect of reducing the pressure to a fixed and uniform measure. Thus by the use of this invention, as the pressure, while it is reduced to the extent adjusted for, is also caused to follow all the variations of the original pressure, great regularity is secured in distribution, and economy in leakage.

For this purpose the gas is passed through a holder working in a closed tank or chamber, and weighted to resist the excess of pressure to be removed. In the crown of the holder there is fitted a valve which opens as the holder rises, and closes as it descends, so as to vary the area of the passage for the gas. From this arrangement it follows that the pressure of the gas after passing the holder must always be less than that of the gas supplied to it, by exactly as much pressure as is required to keep the holder in suspension.

The valve in the crown of the holder may be of any known kind that involves little or no friction in its working. For this purpose it is preferred to employ a conical or conoidal plug fixed in the lower or stationary part of the machine, and projecting through a hole in the crown of the holder, so that as the latter rises the annular area of the passage round the plug increases, and *vice versâ*.

APPLICATIONS FOR LETTERS PATENT.

358.—Hunt, B., Lincoln's Inn, London, "Improvements in direct-acting steam-engines for pumping and other purposes." A communication. Jan. 27, 1877.

448.—Wightman, G., Elksley, Nottingham, and Alley, S., Glasgow, "Improvements in water-meters." Feb. 2, 1877.

451.—Finch, B., High Holborn, London, "An improvement in valve water-closets, and in water-supply valves for the same." Feb. 2, 1877.

480.—Ross, W., Glasgow, "Improvements in apparatus or valves for regulating and supplying uniform quantities of water to, and preventing waste in water-closets, urinals, and other vessels." Feb. 5, 1877.

487.—Mather, W., Salford, Lancs, "Improvements in apparatus to be used in raising water from artesian and other wells." Feb. 5, 1877.

488.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in the treatment of sewage and in the production of manure therefrom, and also in the manufacture of materials therefor, and in the machinery or apparatus to be employed for such purposes." A communication. Feb. 5, 1877.

491.—Otto, N. A., Deutz, Germany, and Crossley, F. W., Manchester, "Improvements in gas motor engines." Feb. 5, 1877.

502.—Chatwin, T., Birmingham, "Improvements in screw-wrenches or screw-spanners, and in gas-grips." Feb. 6, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3138.—Fox, St. G. L., Onslow Gardens, London, "Improvements in the means or apparatus for lighting and extinguishing gas lamps by electricity." Aug. 8, 1876.

3227.—Baldwin, T., Manchester, and Bailey, W. H., Salford, "Improvements in pressure-gauges." Aug. 16, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

353.—Charles, P., "Improvements in apparatus for controlling the supply of water to closets, lavatories, and other places, and preventing waste." Jan. 28, 1874.

403.—Lumley, T., "Improvements in steam-pumps." Jan. 31, 1874.

404.—Cherry, H., "Improvements in steam-pumps." Jan. 31, 1874.

431.—Dennis, T. H. P., "A new or improved water-waste preventer." Feb. 3, 1874.

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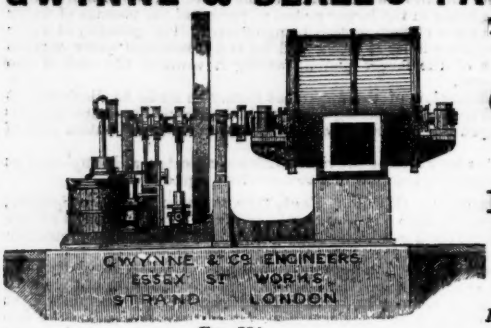

FIG. 224.

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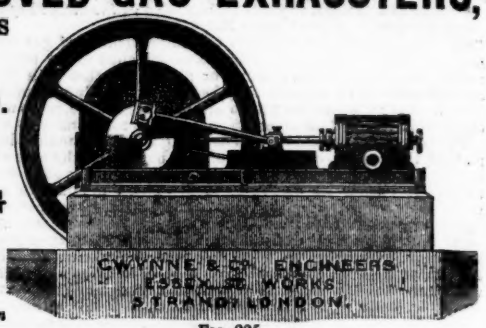

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 62,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters at alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 800 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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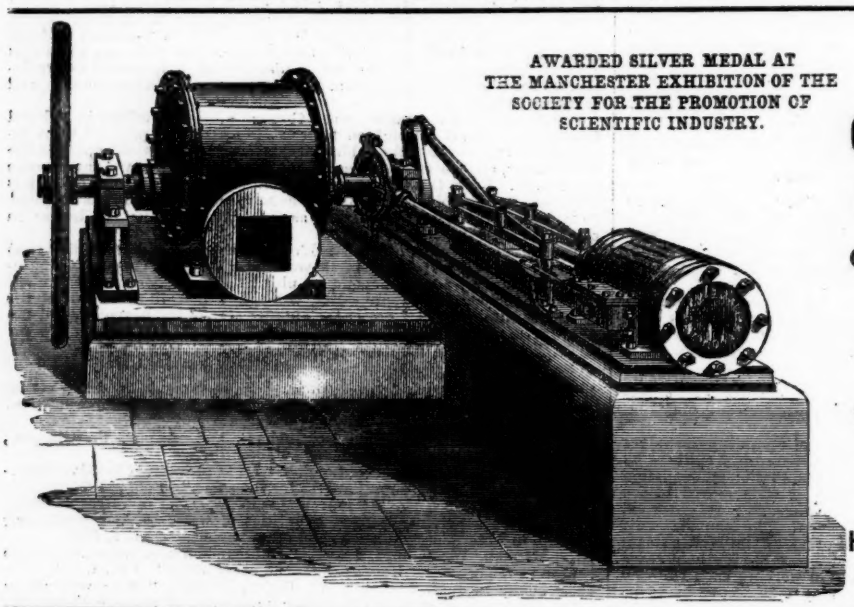

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WANTED, a thoroughly experienced GAS-FITTER. Must be competent to undertake the repair of Wet Meters.
Apply, stating experience, wages required (58 hours), and references, to MAT. I. PARSONS, Manager.

WANTED, Spent Oxide. The Sheffield Chemical Company, Attercliffe, are prepared to PURCHASE large or small quantities.
Address, with particulars, the Proprietors, HORNBY, FAIRBURN, AND Co.

METER REPAIRER.

WANTED, at the Reading Gas-Works, a steady and experienced METER REPAIRER. Used to both Wet and Dry Meters. The situation is a permanent one.
Apply, stating age, experience, and wages required, to Mr. E. BAKER, Engineer.

WANTED, an appointment as Manager of Gas-Works, where the make is from 12 to 20 millions per annum. Well up in manufacture and distribution. 20 years experience. Good testimonials and security.
Address R. P., 117, Maipas Road, New Cross, LONDON, S E.

WANTED, by a Country Gas Company, a steady, respectable Man, who is a good Gas-Fitter, Service Layer, and Smith, and a good general hand at all matters connected with Gas, either in or out of the Works. One from a country Gas-Work would be preferred, and none need apply who are not fully competent to perform the duties required. Wages to commence, 30s. per week.
Address No. 345, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED to Freight.—Two Screw Steamships will be required by the London Gas-Light Company to freight, running continuously, for a term of Five or Seven years, and delivering Coals in the Thames at the Company's Wharf, Nine Elms. They must each deliver not less than 800 tons per voyage.
The Ships will have to be specially constructed for passing through the bridges crossing the Thames, to the above point. The depth of water provided at the Wharf will be 13 feet at high water, neap tides.
Further particulars may be obtained by application at the Company's Offices, 26, Southampton Street, Strand, London.
By order,
A. J. DOVE, Secretary.
Feb. 1, 1877.

TRAVELLER Wanted, by an Iron and Brass Tube Company, established over 30 years. He would chiefly have to solicit orders for Iron Gas, Steam, and Water Tubes and Fittings.
Apply, by letter only, to G. T. S., Smith's Library, 33, Union Street, BIRMINGHAM.

FOR SALE, as they stand, four Dry- Lime PURIFIERS, 6 feet square in the clear, with grids, valves, and connexions complete.
Apply to JOHN DAVIES, Manager, NANTWICH.

FOR SALE, a Set of 6-in. Vertical CONDENSERS, with tar-box and all connexions complete.
May be seen, and price obtained, on application to the Southbank and Normanby Gaslight and Coke Company, Limited, Southbank, YORKSHIRE.

HAMPTON COURT GAS COMPANY.

TO BE SOLD cheap, as they stand, Four Cast-Iron PURIFIERS, 8 feet square, with wrought-iron covers, wood sieves, columns, girders, and lifting apparatus complete; and 8-inch Hydraulic Centre Valve and connexions, all in good condition.
Apply to Mr. E. PRICE, Engineer, Gas-Works, HAMPTON WICK.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24in. by 6in., with tar-boxes, dips, and syphons.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

LYTHAM IMPROVEMENT COMMISSIONERS.

TO GASHOLDER MAKERS.

THE Gas Committee of the above Board are prepared to receive TENDERS for the supply and erection, at their Gas-Works, of a Single-lift GAS-HOLDER, 60 feet diameter by 16 feet deep, in cast-iron tank.
Plans and specifications may be seen on application to Mr. Thomas Bower, Manager, Gas-Works, Lytham, and any further particulars may be had on application to Mr. A. Fleming, Scale Ford, Lancaster, to whom tenders must be sent under cover, endorsed "Tender for Gasholder and Tank," not later than Thursday, the 1st day of March next.
The Committee do not bind themselves to accept the lowest or any tender.
By order of the Committee,
THOS. BOWER, Gas Manager.
Lytham, Feb. 7, 1877.

SHREWSBURY GAS COMPANY.

THE Directors are desirous to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their works for a term of three years, from July 1, 1877. Particulars as to quantities made may be had on application.
Tenders to be sent in separately for Tar and Water, at per ton of 2240 lbs., before the 20th of February next.
By order,
Jan. 27, 1877. S. B. DARWIN, Secretary.

BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Cor- poration are prepared to receive TENDERS for 700 yards of 12-inch Cast-Iron GAS-PIPES.
Specifications and forms of tender may be obtained on application to Mr. Wm. Carr, at the Gas-Works, Halifax, and tenders, properly endorsed, must be sent to me on or before Thursday, the 22nd day of February, 1877.
By order,
A. C. FOSTER, Town-Clerk.
Town-Hall, Halifax, Feb 9, 1877.

TO GASHOLDER MAKERS.

THE Directors of the Rastrick Gas Com- pany are desirous of receiving TENDERS for the construction and erection of a Single-Lift GASHOLDER, 90 ft. diameter and 20 ft. deep.
Plans and specifications may be seen at the Company's Offices, Bird's Royd, Rastrick, on and after Thursday, the 8th day of February, 1877.
Sealed tenders endorsed "Tender for Gasholder," to be sent to the undersigned not later than Saturday, the 17th day of February, 1877.
The Directors do not bind themselves to accept the lowest or any tender.
JOHN TEYLOW, Secretary.
Rastrick, Jan. 24, 1877.

TO GASHOLDER MAKERS.

THE Town Council of the Borough of Bury are prepared to receive TENDERS for a Two-lift Telescopic GASHOLDER, 120 feet diameter by 35 feet deep.
Plans, specifications, and other particulars may be obtained on application to Mr. Kelsall, at the Gas-Works, Elton, Bury, Lancashire.
Sealed tenders, addressed to his Worship the Mayor, Gas-Works, Bury, endorsed "Tender for Gasholder," to be sent in on or before the 8th day of March next.
The Council do not bind themselves to accept the lowest or any tender.
By order,
F. BULL, Town-Clerk.
Corporation Offices, Bank Street, Bury, Lancashire, Feb. 6, 1877.

TO BUILDERS AND GAS ENGINEERS.

THE Gas Committee of the Corporation of Salford invite TENDERS for the erection of a New PURIFYING-HOUSE at the Regent Road Works, and for the supply and fixing of machinery connected with it.
Plans may be seen and all particulars obtained from the engineer, Mr. Samuel Hunter, Lamb Lane Gas-Works, Salford.
Tenders must be delivered to me on or before the 17th of February next, endorsed "Purifying-House, &c., Contract."
The Committee do not bind themselves to accept the lowest or any tender.
By order,
CHRIS. MOORHOUSE, Town-Clerk.
Town-Hall, Salford, Jan. 26, 1877.

TO GASHOLDER MAKERS.

THE Gas Committee of the Sowerby Bridge Local Board of Health are prepared to receive TENDERS for the construction and erection of a Telescopic GASHOLDER, 75 feet diameter.
Plans may be seen, and all particulars obtained, from Mr. Saville, Gas Engineer, at the Gas-Works.
Tenders to be sent in not later than Six o'clock on Thursday, March 1, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gasholder."
The Committee do not bind themselves to accept the lowest or any tender.
By order,
CHARLES BARSTOW, Solicitor,
Clerk to the Board.
Town-Hall, Sowerby Bridge, Feb. 8, 1877.

LITTLEBOROUGH GAS COMPANY.

TO IRONFOUNDERS.

THE Directors of the above Company are prepared to receive TENDERS for the supply of the following Cast-Iron PIPES with turned and bored joints, to be delivered at Littleborough Station:—

	Weight per Yard.
300 yards 15 in., in lengths of 9 ft. each . .	280 lbs.
600 yards 10 in., in lengths of 12 ft. each . .	168 lbs.

Any excess in the above weights will not be paid for.
Further particulars may be obtained on application to the undersigned, to whom tenders are to be sent, and endorsed "Tender for Gas-Pipes," on or before Friday, the 16th of February.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
JOHN COCKCROFT, Manager.
Littleborough, near Manchester, Feb. 1, 1877.

MANCHESTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the purchase of the whole or portion of the GAS TAR to be produced at their Gaythorn and Rochdale Road Works for the term of one or more years, as may be agreed upon, commencing on March 1, 1878. The total quantity that will be produced during the first year is estimated at 15,000 tons or thereabouts.
Sealed tenders, addressed to the Chairman of the Gas Committee, City Hall, and endorsed "Tender for Gas Tar," must be delivered at this Office on or before the 20th day of March next.
The Committee do not bind themselves to accept the highest or any tender.
Further particulars as to conditions of contract, and forms of tender may be obtained on application to Mr. Jackson, at the Gas Office.
By order of the Gas Committee,
JOSEPH HERON, Town Clerk.
Gas Office, City Hall, Manchester, Jan. 27, 1877.

BROMLEY GAS CONSUMERS COMPANY.

NOTICE is hereby given, that the YEARLY ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Bell Hotel, Bromley, Kent, on TUESDAY, the 27th day of February inst., to receive the Report of the Directors, and Balance-Sheet approved by the Auditors, to declare a dividend, and for general business.
The chair will be taken at half-past Five o'clock precisely.
By order,
GEORGE H. OSBORN, Secretary and Manager.
Offices and Works, Brick-kiln Lane, Bromley, Kent, Feb. 10, 1877.

LLANELLY GAS-WORKS.

TO CONTRACTORS, BUILDERS, AND OTHERS.
CONTRACT No. 1.

THE Directors of the Llanelly Gaslight Company are prepared to receive TENDERS for the excavating and building of a Brick TANK, 92 ft. diameter and 25 ft. deep.
Drawings and specifications may be seen on application at the Gas-Works, Llanelly.
Sealed tenders to be sent in on or before Friday, March 2nd, addressed to the Chairman of the Gas Company, and endorsed "Tender for Tank."
The Company do not bind themselves to accept the lowest or any tender.
Further particulars may be obtained from the Engineer.
By order,
HENRY R. MARTIN, Engineer.

LLANELLY GAS-WORKS.

TO GASHOLDER MAKERS AND OTHERS.
CONTRACT No. 2.

THE Directors of the Llanelly Gaslight Company are prepared to receive TENDERS for the supplying, fixing, and completion of a GASHOLDER, 88 ft. diameter and 25 ft. deep, with all necessary guides, wheels, columns, and girders complete, to be erected at their Works, Llanelly.
Drawings and specifications may be seen on application at the Gas-Works, Llanelly.
Sealed tenders to be sent in on or before Friday, March 2nd, addressed to the Chairman of the Gas Company, and endorsed "Tender for Gasholder."
The Company do not bind themselves to accept the lowest or any tender.
Further particulars may be obtained from the Engineer.
By order,
HENRY R. MARTIN, Engineer.

TO GASHOLDER MAKERS AND OTHERS.

THE Directors of the Gravesend and Milton Gaslight Company are prepared to receive TENDERS for the construction and erection of a Single-lift GASHOLDER and TANK—the Holder to be 80 feet in diameter, with a depth of 20 feet; the Tank to be 20 feet in depth—to be erected at their Works, Canal Basin, Gravesend.
The plans and specification of the Holder lie for inspection at the Offices of the Company, No. 9, Berkley Crescent, Gravesend, between the hours of Ten and Five.
The tenders will be considered at a Board Meeting on Thursday, March 1, at Twelve o'clock noon, and tenders must be sent or delivered at the Company's Office as above before that time, sealed and addressed to the Directors, and endorsed "Tender for Gasholder.
Any further particulars can be obtained of the Superintendent, Mr. Marvin, at the Office or Works.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
TUFNELL SOUTHGATE, Secretary.
Feb. 8, 1877.

BOROUGH OF PORTSMOUTH WATER-WORKS.

TENDERS FOR CAST-IRON PIPES.

THE Directors of the Borough of Ports- mouth Water-Works Company are prepared to receive sealed TENDERS for the supply of about 1125 tons, more or less, of 12-inch Cast-Iron PIPES, and about 10 tons of IRREGULAR CASTINGS, with the right of the Company to increase the quantity to 2250 tons of the same sized pipes, and to 20 tons of Irregular Castings, in their discretion, on reasonable notice.
Copy of conditions of contract, specification, and form of tender may be obtained at the Secretary's Offices, 31, St. Thomas Street, Portsmouth, or at the Office of Messrs. Joseph Quick and Son, C.E., No. 29, Great George Street, Westminster, on and after Friday, the 2nd of February next, and tenders must be delivered at the Company's Office, at Portsmouth, at or before Ten o'clock in the forenoon of Friday, the 16th day of February next.
The tenders to be addressed to the Directors, under cover to the Secretary, and marked "Tender for Cast-Iron Pipes."
The Company do not pledge themselves to accept the lowest or any tender.
Dated this 26th day of January, 1877.
R. W. FORD, Secretary.

W. HAILES,
BUILDER & RETORT-SETTER,
CONTRACTS FOR THE SETTING OF RETORTS In Large or Small Works, at Home and Abroad.
Sixteen Years with the Commercial Company, London. Setter for the Isle of Thanet, Dartford, and Brentford Companies, &c., &c. References if required.
ADDRESS,
3, HIGH STREET, BRENTFORD, MIDDLESEX.

CATHELS'S IMPROVED
RETORT-SETTINGS.
GUARANTEED TO HEAT UNIFORMLY WITH THE MINIMUM OF FUEL.
Coloured Lithograph copies of Working Drawings of Beds of 1, 2, 3, 5, 6, and 7 Retorts each, so clearly arranged and fully shown as to be easily understood by any retort-setter or bricklayer, having just been made of these valuable Settings, they can now be supplied with detailed specifications, immediately on receipt of orders.
Applications to be made to Mr. THOS. NEWBIGGING, Gas and Consulting Engineer, 5, Norfolk Street, MANCHESTER.

GAS-WORKS CLAUSES AMENDMENT ACT, 1871.

ANNUAL ACCOUNTS OF GAS COMPANIES.

FORMS OF ANNUAL ACCOUNTS, arranged as required by the 35th Section of the Act (34 & 35 Vict., cap. 41), are now ready.

These Forms have been printed on large sheets of paper of the best quality, and are carefully ruled so as to afford the utmost facility for compliance with the provisions of the Act.

Price 3s. 6d. per dozen, free by post, or may be ordered of any Bookseller.

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11, BOLT COURT, FLEET STREET, E.C.

A Specimen Sheet on receipt of Six postage stamps.

NOW READY,
THE
GAS COMPANIES EXPENDITURE JOURNAL,

Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.

Prices, half bound, cloth sides, 2 quires, 30s.; 3 quires, 36s.; other sizes and bindings to order.

Published by EDWARD SANDELL, Accountant, 4, Skinner's Place, Size Lane, QUEEN VICTORIA STREET, and W. B. KING, Office of the JOURNAL OF GAS LIGHTING, 11, Bolt Court, FLEET STREET, E.C.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

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HENRY LYON,
ENGINEER,
AND
CONSULTING GAS ENGINEER,
BROOKLYN, CHEETHAM HILL ROAD,
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ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

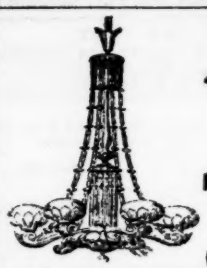
JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

MR. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.



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MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.
ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

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N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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STOURBRIDGE FIRE-CLAY WORKS, GATESHEAD-ON-TYNE,
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FIRE-BRICKS, FIRE-CLAY LUMPS, QUARLS, GAS-RETORTS,
SANITARY PIPES, CHEMICAL PIPES, &c.
All made of the best quality of Fire-Clay, wrought from Whickham Colliery.

J. S. & SONS having during the past year erected large Works at Derwenthaugh, in addition to their old Works at Gateshead-on-Tyne, are in a position to supply large orders with the greatest despatch.

GEORGE ORME & CO.,
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MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
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LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

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GAS AND CONSULTING ENGINEER,
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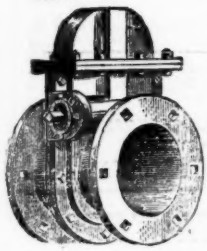
PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.
FUEL-MACHINE, for Compressing Breeze and Tar.
WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

ALSO MAKERS OF

J. BEALE'S NEW PATENT GAS EXHAUSTERS
(SOLE MAKERS),

STEAM ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
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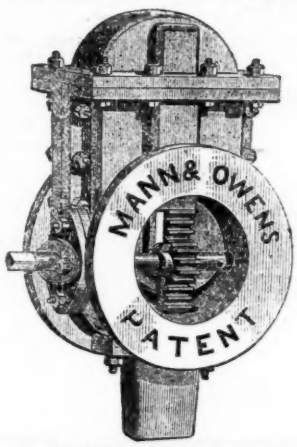
ESTIMATES FOR GAS-WORKS OF ANY SIZE.

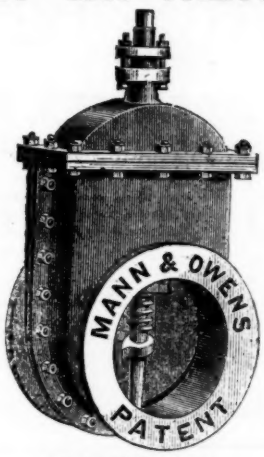
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—It is most particularly requested that all Communications be addressed to the **FIRM ONLY**, as circumstances have arisen which render this necessary.

MANN & OWENS' PATENT GAS-VALVE.



RACK AND PINION VALVE.



SCREW VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:

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PRICES, SIZES AND FULL PARTICULARS ON APPLICATION.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

FERGUSON, Builder and Contractor. Kite method of Repairing Church Spires and High Chimneys. Chimneys straightened, pointed, and hooped. Old Chimneys pulled down by a process requiring no scaffolding or stoppage of work, by competent workmen, under personal supervision. For Lightning Conductors—cheapness and method of fixing—apply to C. R. FERGUSON, 13, Canal Road, MILE END.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

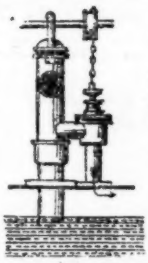
By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH.

Testimonials and particulars on application.

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It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

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HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876 "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9366 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

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SIZE STRENGTHS &c OF ROLLED JOISTS.

A	B	C	D	E	A	B	C	D	E
41	18½	7"	102	810	19	6"	5"	30	85
1	16"	5⅞"	57⅞	400	17	6¼	3"	18	45
31	15	5"	50½	330	18	6¼	2"	10¾	30
3	14"	5½	60	325	20	5½	2"	10&12	22½
4	13"	6"	56	300	35	5½	7¾	12½	50
5	12"	5½	42	220	23	5"	4½	23	35
20	10"	5"	36	175⅞	22	5	3"	13	30
8	10"	4½	32	130	36	4½	2"	8	17½
8*	8½	4½	23	116	40	4"	3"	11	20
9	9¼	3⅜	24&30	90	25	4"	2"	6⅛	14
33	8¾	2¾	18	60	37	3"	2"	5½	10
12	8"	4"	28	80	38	3"	3"	9	17½
11	8"	3"	29	95	A	N° on Section Sheet			
13	8"	2½	15	40	B	Depth in Inches			
39	7"	4"	22½	70	C	Width of Flange			
15	7"	3½	19	60	D	Usual Weight per F.t			
16	7"	2½	"	35	E	Constant.			

TO FIND SAFE DISTRIBUTED LOAD IN TONS DIVIDE THE CONSTANT BY THE SPAN IN FEET.

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HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

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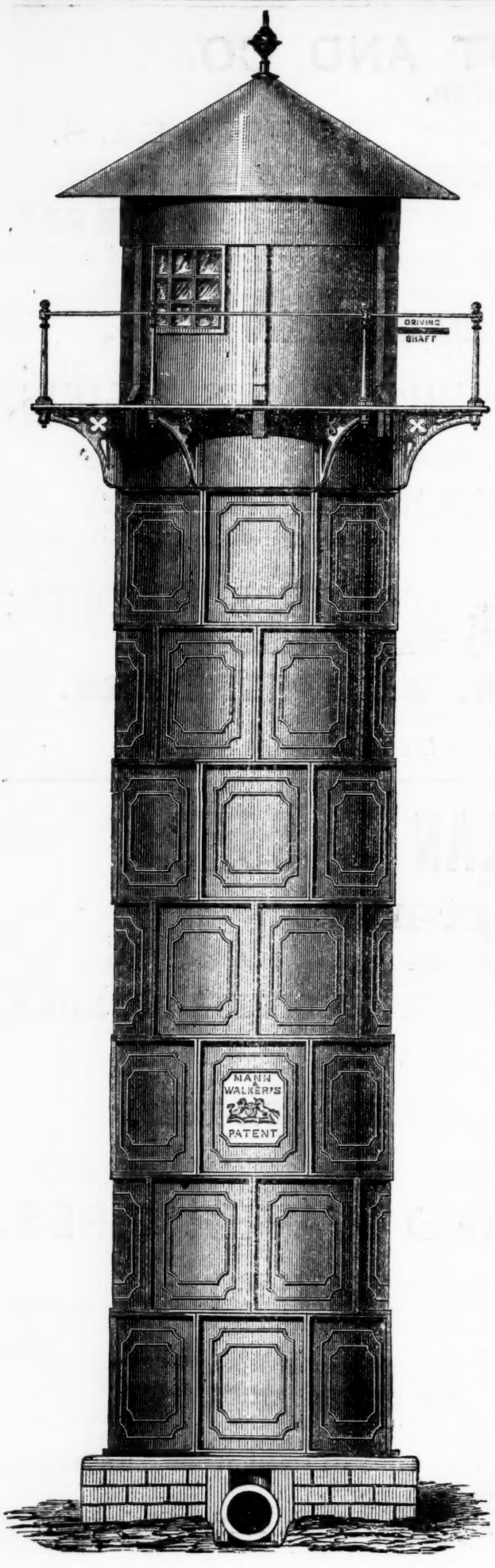

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By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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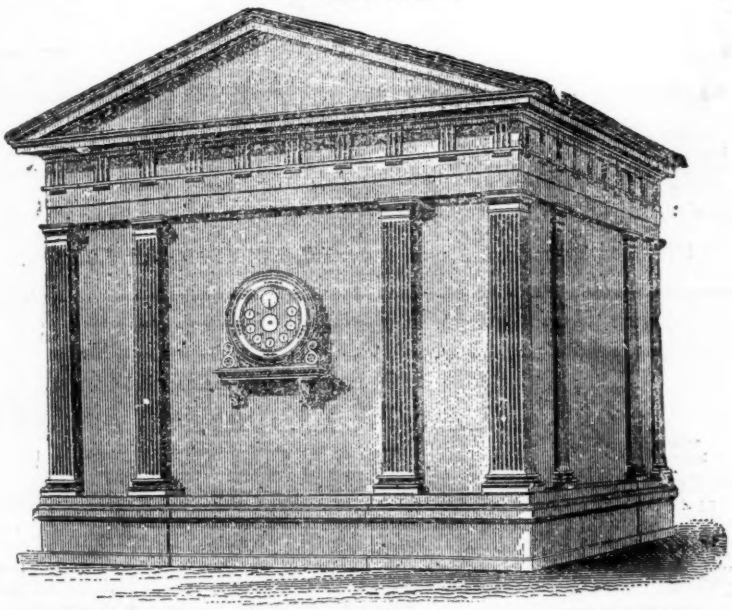

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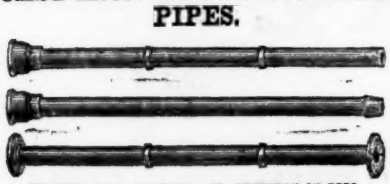

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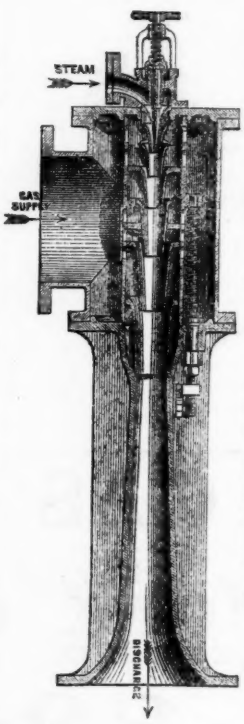

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Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

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FIRST-CLASS GAS COALS,

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Buyers can rely upon the Coals being fresh wrought, and free from pyrites, band, &c.

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THE ORIGINAL MANUFACTURER OF

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JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

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STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

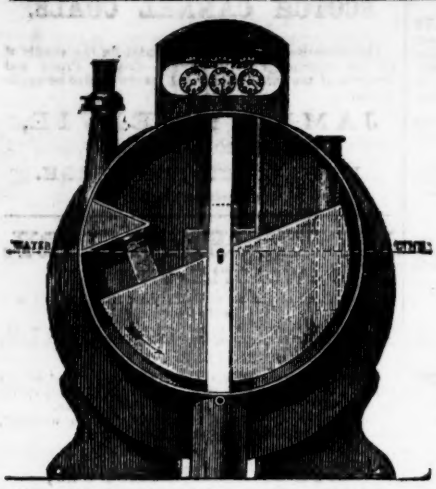
	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.



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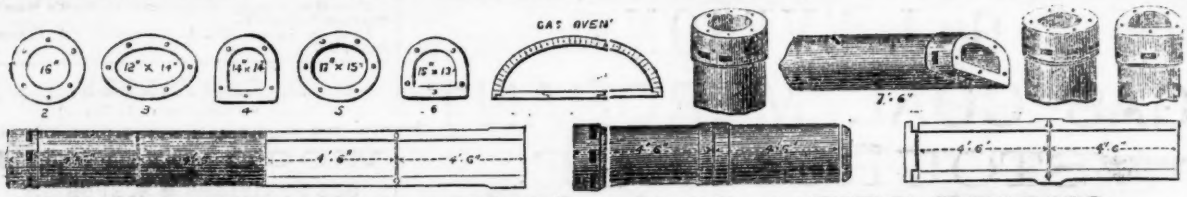

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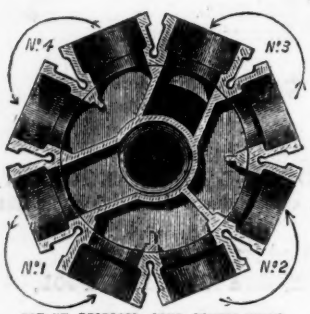

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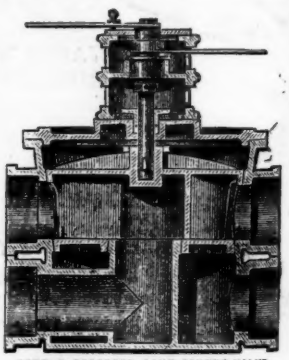

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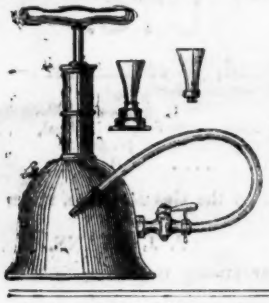

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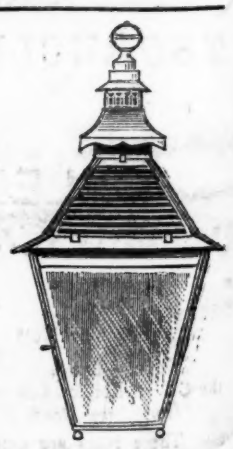

55 and 56, HIGH HOLBORN, LONDON.

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